Rabies is an acute, progressive, fatal encephalitis caused by viruses in the family Rhabdoviridae, genus Lyssavirus. Globally, 11 major genotypes have been identified as etiologic agents of this zoonosis (Kuzmin et al., 2005). Rabies virus (RABV), the type species, is the most widespread and epidemiologically important member of the genus and the only taxon documented in the New World. Major mammalian reservoirs reside in the orders Carnivora and Chiroptera. Several specific RABV variants have been characterized from different mammalian hosts, such as dogs, foxes, mongooses, and other carnivores, and bats. It is still a major public health problem in most developing countries including India where an estimated 20,000 human deaths and 17 million animal bites are reported every year (Sudarshan et al., 2007). The main vector of rabies in India is dog in over 95% of human cases but other animals like cats, monkeys, mongooses and wild animals also transmit the disease. The presently WHO recommended gold standard technique for postmortem diagnosis of rabies is the Fluorescent antibody technique (FAT) (Dean et al., 1996), is limited by the costs of acquiring and maintaining a fluorescent microscope. Difficulties in obtaining diagnostic results from field material have led to widespread under reporting of disease. Thus there is a need for a rapid diagnostic technique that can be adapted to field conditions which is economical for the resource constraint countries but also as sensitive and specific as FAT. Recently the Centers for Disease Control (CDC) Atlanta, has developed a simple and rapid technique for rabies diagnosis based on the principle of immunohistochemistry where the rabies virus nucleoprotein (N) antigen in the brain smear is captured by a cocktail of biotinylated monoclonal antibody and subsequent color development. This technique, which is known as the direct rapid immunohistochemical test (dRIT), has been found to be as specific and sensitive as the gold standard FAT and has undergone limited field trials in Africa, China, Afghanistan, Iraq and in India (Lembo et al., 2006; Durr et al., 2008; Tao et al., 2008; Saturday et al., 2009 and Madhusudana et al., 2012). In this study, the results clearly establish that the dRIT is as sensitive and specific as FAT and has the potential to replace the FAT in resource constrained developing countries.

ABSTRACT

A direct rapid immunohistochemical test (dRIT) to detect rabies virus (RABV) antigen has been developed by incorporating various components of existing immunoperoxidase techniques. The gold standard diagnostic technique for rabies is the Fluorescent antibody technique (FAT) which is very expensive and requires a high level of expertise. There is a need for more economical and user friendly tests, particularly for use in developing countries. The dRIT is one such test for diagnosis of rabies using brain touch impressions. The test is based on capture of rabies nucleoprotein (N) antigen in brain smears using a cocktail of biotinylated monoclonal antibodies specific for the N protein and colour development by streptavidin peroxidase- amino ethyl carbazole and counter staining with haematoxylin. The test was done in parallel with standard FAT using 60 brain samples from different animals including dog (n=52), cat (n=02), cattle (n=04) and horse (n=02) were collected during the study from different geographical locations of the country viz., Karnataka, Tamilnadu, Kerala, Maharashtra and Andhra Pradesh. The rabies virus N protein appears under light microscope as reddish brown particles against a light blue background. There was 100 % correlation between the results obtained by the two tests. Also, interpretation of results by dRIT was easier and only required a light microscope. To conclude, this newly developed dRIT technique promises to be a simple, cost effective diagnostic tool for rabies and will have applicability in field conditions prevalent in developing countries.

Key words: Direct rapid immunohistochemical test, Fluorescent antibody technique, Immunohistochemistry.
MATERIALS AND METHODS

Collection and Preservation of Brain samples: A total of 60 brain samples from suspected cases of rabies from different species including dog (n=42), cat (n=02), cattle (n=04) and horse (n=02) were collected during the study from different geographical locations of the country viz., Karnataka, Tamilnadu, Maharashtra and Andhra Pradesh. The tissue samples were stored in a mixture of 50 per cent glycerol in Phosphate Buffered Saline (PBS) as they are generally suitable for all the laboratory tests. The specimens were placed in leak proof rigid containers and sent to the laboratory under cold chain by the direct route available. All the diagnostic specimens were stored at -80°C until processed.

Fluorescent antibody technique (FAT): This test was performed as per the WHO recommended procedure (Dean et al., 1996). Briefly, smears were made from brain samples after washing them thoroughly with normal saline. The smears were air dried for 5 min and fixed in cold acetone for 2 h. They were then stained with a 1:20 dilution of anti-rabies virus nucleoprotein conjugated FITC polyclonal antibody (Bio-Rad, France) for 30 min and observed under an inverted fluorescence microscope (Nikon, Eclipse) with 400x magnification. Positive and negative smears made from infected and healthy brains respectively were used as controls. Brain smears showing green fluorescent particles of varying size either scattered or within the neurons were considered positive for rabies virus.

Direct Rapid Immunohistochemical Test (dRIT): Touch impressions of brain tissue were made on labelled glass microscope slides. The slides were air-dried, fixed in 10% buffered formalin for 10 min, dip-rinsed in phosphate buffered saline with 1% Tween 80 (TPBS), immersed in 3% hydrogen peroxide for 10 min and dip-rinsed in fresh TPBS. After dipping, the excess buffer was shaken from the slides and blotted from the edges surrounding the impression. This treatment was repeated after each rinsing step. The slides were incubated in a humidity chamber (a cover on a moistened paper towel on an even surface) with the monoclonal antibody (Mab) cocktail for 10 min, dip-rinsed in TPBS, incubated with streptavidin-peroxidase complex (Kierkegaard and Perry Laboratories, Inc., USA) for 10 minutes and dipped in TPBS. AEC (3-amino-9-ethylcarbazole) stock solution was prepared by dissolving one 20 mg tablet of AEC (Sigma-Aldrich Corp, St.Louis, MO, USA) in 4 ml N, N-dimethyl-formamide (Fisher Scientific International, Inc., USA) and stored at 4 °C. A working dilution was prepared by adding 1 ml AEC stock solution to 14 ml acetate buffer (Polyscientific, USA) and 0.15 ml 3% hydrogen peroxide. The slides were incubated with the AEC peroxidase substrate for 10 min and dip-rinsed in distilled water. They were then counterstained with Gill’s hematoxylin (Fisher Scientific International) diluted 1:2 with distilled water for 2 min and dip-rinsed in distilled water. Finally, they were examined by light microscopy (Leica Microsystems AG, Germany) with 200x magnification to scan the field and a 400x magnification for visualization. Rabies virus nucleoprotein antigen appears as red inclusions against a blue background.

RESULTS AND DISCUSSION

All the 60 rabies suspected brain samples were examined by the dRIT and FAT. In the FAT, healthy brain smears did not show any fluorescence (Fig. 2A) and in the dRIT, only a background light blue colour was observed (Fig. 1A). In the FAT test, the positive smears showed bright green fluorescence particles of varying size either scattered or within the neurons (Fig. 1B and 3A). The brain samples which were positive by FAT were also positive by dRIT and the negative samples were negative by both the tests. Thus there was 100% concordance between the two tests. The results of different brain samples tested by the two techniques are depicted in Table. These findings are in agreement with the Lembo et al., 2006; Durr et al., 2008 and Madhusudana et al., 2012 who also evaluated the dRIT in parallel with FAT and reported that the sensitivities and specificities of the dRIT was 100% in comparison.
with FAT. The recently developed technique dRIT by CDC, Atlanta appears to be a cost effective alternative to the relatively expensive FAT for the diagnosis of Rabies. Most of the brains tested in this study were preserved in 50% glycerol saline. The use of biotinylated cocktail monoclonal antibodies to N protein assures an extreme degree of specificity. The antibody conjugate used for FAT was polyclonal. The capturing antibody correlated between FAT and dRIT despite the fact that the antibody used in dRIT was monoclonal (Madhusudana et al., 2012). This could be attributed to the fact that the Mab supplied by the CDC is a cocktail of three Mab’s to 3 different antigenic sites of N protein and has the capacity to react with all the virus strains of genotype I.

**Table:** Comparison between direct rapid immunohistochemical test and Fluorescent antibody technique

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Species</th>
<th>dRIT Positive</th>
<th>dRIT Negative</th>
<th>FAT Positive</th>
<th>FAT Negative</th>
<th>Correlation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dog</td>
<td>44</td>
<td>08</td>
<td>44</td>
<td>08</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Cat</td>
<td>02</td>
<td>0</td>
<td>02</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Cattle</td>
<td>04</td>
<td>0</td>
<td>04</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Horse</td>
<td>02</td>
<td>0</td>
<td>02</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

To conclude, the dRIT showed a sensitivity and specificity equivalent to that of the FAT. The test appears simple, requires no specialized equipment or infrastructure, and can be successfully performed on samples preserved in glycerol saline. These qualities make it ideal for testing under field conditions and in developing countries of Asia where rabies is still major public health problem. Although further laboratory and field evaluations are required, the present results are promising and highlight the potential value of the dRIT for countries with limited diagnostic resources. The test will also be useful for cost-effective surveillance of rabies in countries where it is still endemic and could be extremely valuable in guiding decisions regarding rational use of rabies post exposure prophylaxis (PEP).

**REFERENCES**


Assessment of the Immune Status of Dogs with Pyoderma*

Kshama, M.A.¹ Yathiraj, S.,² Isloor, S ³ and Suryanarayana,T ⁴
Department of Veterinary Medicine, Veterinary College, KVAFSU Bangalore, India

ABSTRACT

The role of immune status especially immunodeficiency in the development of pyoderma in dogs was assessed in 50 dogs with pyoderma and 8 apparently healthy dogs during the present study. The immunoglobulin levels in the serum samples were measured indirectly by Polyethylene Glycol Immunoglobulin Precipitation method and the total leucocyte and lymphocyte counts in the blood samples were enumerated using the hematology analyser. The Mean ± SE of immunoglobulin levels in dogs with pyoderma was 4.43 ± 0.1787 g/dl as against 3.73 ± 0.1211 g/dl in apparently healthy dogs. The Mean ± SE of total leucocyte count in dogs with pyoderma was 14228 ± 650 cells/mm³ as against 10365 ± 715 cells / mm³ in apparently healthy dogs and the Mean ± SE of total lymphocyte count in dogs with pyoderma was 4402 ± 317 cells / mm³ as against 3970± 380 cells/mm³ in apparently healthy dogs. Thus the results of the study found no evidence of immunodeficiency in dogs with pyoderma either based on immunoglobulin levels or the leukogram. On the other hand, an increase in immune response was observed in dogs with pyoderma. It was concluded that immunodeficiency might not be an important factor in the occurrence of pyoderma. However, more studies are warranted in this direction.

Key words: Immunoglobulin levels, Immunodeficiency, Pyoderma,
RESULTS AND DISCUSSION

Total Leukocyte and Total Lymphocyte Count:
The total leucocyte count, total lymphocyte count and immunoglobulin status were analyzed in fifty dogs with pyoderma and eight apparently healthy dogs. Blood samples were analyzed from 50 dogs with pyoderma. The Mean ± SE of the total leucocyte count was 14228 ± 650 cells/mm³. This was found to be significantly higher (P≥0.05) than that of 10365 ± 715 cells / mm³ observed in apparently normal dogs (Table 1). On a breed-wise assessment there was no significant differences in leucocyte counts between breeds though 5 dogs with deep pyoderma (2 German Shepherds, 1 each of Labrador Retriever, Neopolitan Mastiff and Pug) showed lower leucocyte counts.

Table 1: Mean ± SE of total leukocyte count, lymphocyte count and immunoglobulin levels in dogs with pyoderma during the study (n=50)

<table>
<thead>
<tr>
<th></th>
<th>Total Leukocyte count (cells/ mm³) Mean±SE</th>
<th>Total Lymphocyte count (cells/ mm³) Mean±SE</th>
<th>Total Immunoglobulin levels (g/dl) Mean±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs with pyoderma (n=50)</td>
<td>14228 ± 650</td>
<td>4402 ± 317</td>
<td>4.43 ± 0.1787</td>
</tr>
<tr>
<td>Control group (n=8)</td>
<td>10365 ± 715</td>
<td>3970 ± 380</td>
<td>3.73 ± 0.1211</td>
</tr>
</tbody>
</table>

The Mean ± SE of the total Lymphocyte count of dogs with pyoderma was 4402 ± 317 cells / mm³ as against 3970± 380 cells/mm³ in apparently normal dogs(Table 1). Lymphocyte count of below 1000 cells/ mm³ is suggestive of immune deficiency (DeBoer, 1995) and this value has been taken as the reference value to diagnose immune deficiency in the present study. The lymphocyte count observed in the present study was significantly higher (P ≥0.05) than 1000 cells/ mm³. Thus, there was no indication of immunodeficiency or lymphocyte dysfunction in the present study. This is in accordance with the report of Foster (2004) who has opined that though severe combined immunodeficiency in dogs is a well characterized primary immunodeficiency involving lymphocytes, establishing a causal relationship between a skin disease and presumed immunodeficient state has been difficult. A similar result was reported by Wisselink et al. (1988) following a study on immunologic aspects of German Shepherd Pyoderma using parameters such as chemotaxis and neutrophilic phagocytosis wherein it was concluded that dogs with GSP are immunologically normal reactors. On the other hand, in the present study an increased number of leukocytes and lymphocytes suggestive of an increased immune response were observed which could be due to pyoderma per se or some other underlying factor and the same could not be correlated due to paucity of literature. However, unlike in the present study, Day (1994) following a study of dogs with pyoderma and normal dogs found a decrease in the numbers of T-lymphocytes (expressing the CD3 marker) in German Shepherd dogs with pyoderma unlike in normal dogs thus suggesting the role of T cell dysfunction in the pathogenesis of German Shepherd Pyoderma. Similarly, Toman et al. (1997) in a study on dogs with pyoderma and demodicosis found significant depression in the phagocytic activity and lymphocyte activity in German shepherd dogs with deep pyoderma.

Immunoglobulin levels: The Mean ± SE immunoglobulin level of 50 dogs with pyoderma are depicted in the Table 1. The mean immunoglobulin level was 4.43 ± 0.1787 g/dl (Table 1). This includes dogs with superficial as well as deep pyoderma belonging to different breeds. This was significantly higher (P>0.05) than that observed in the 8 apparently healthy dogs which served as control for which the value was 3.73 ± 0.1211 g/dl. Further a breed-wise study failed to reveal any indication of immunodeficiency in any of the breeds evaluated (Table 2). The breed wise Immunoglobulin levels are given in Table 2. German shepherds are said to be genetically predisposed to German Shepherd Pyoderma and immunodeficiency is said to be contributing factor.
The Mean ± SE of immunoglobulin levels in German Shepherd dogs was 4.58 ± 0.1658 which was significantly higher than that of normal dogs.

**Table 2:** Breed-wise total immunoglobulin levels in dogs with pyoderma during the study (n=50)

<table>
<thead>
<tr>
<th>Breed</th>
<th>Mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nondescript (n=2)*</td>
<td>4.70</td>
</tr>
<tr>
<td>German Shepherds (n=20)</td>
<td>4.58 ± 0.1658</td>
</tr>
<tr>
<td>Maltese Terrier (n=1)*</td>
<td>4.46</td>
</tr>
<tr>
<td>Spitz (n=2)*</td>
<td>4.43</td>
</tr>
<tr>
<td>Golden Retriever (n=3)*</td>
<td>4.42</td>
</tr>
<tr>
<td>Labradors (n=13)</td>
<td>4.40 ± 0.1751</td>
</tr>
<tr>
<td>Neopolitan Mastiff (n=2)*</td>
<td>4.36</td>
</tr>
<tr>
<td>Great Dane (n=2)*</td>
<td>4.35</td>
</tr>
<tr>
<td>Boxer (n=1)*</td>
<td>4.31</td>
</tr>
<tr>
<td>Pug (n=4)*</td>
<td>4.27</td>
</tr>
</tbody>
</table>

* No statistical analysis was done due to less number of cases in these breeds

These findings are in agreement with those of Wisselink et al. (1988) who found significantly elevated levels of IgG and IgM and bacterial components associated and non associated with circulating immune complexes following a nephelometric assay of serum samples from dogs with German shepherd pyoderma wherein they concluded that dogs with German Shepherd pyoderma were immunologically normal reactors. Similarly, Georgieva et al. (2011) following experimental infection of dogs with *S. intermedius* found an increase in immunoglobulin concentration but the increase was not statistically significant and they reported a strong increase in immunoglobulin concentrations following natural infections as well, prompting them to conclude that there was an overall increase in the concentration of globulins and immunoglobulins in pyoderma. On the other hand, Toman et al. (1997) in a study of dogs with pyoderma and demodicosis found significant increase in total serum immunoglobulins in all groups of dogs with superficial pyoderma but immuno suppression was found in most of the German Shepherd dogs (7 out of 10) with deep pyoderma. The increase in the immunoglobulin levels in the present study could be due to increased immune response to the bacterial antigens.

Thus, the overall results of the study regarding the immune status of animals based on leukogram as well as immunoglobulin levels did not indicate any immunodeficient state and on the other hand there was an increased immune response. In a study on immunological indicators in dogs with deep pyoderma, Sprucek et al. (2007) concluded that though immunological indicators are involved in canine deep pyoderma, overall charges in immune system were weak and that there was little hope that these indicators could be of diagnostic value in clinical practice. According to Ihrke (2005), despite its attractiveness as a concept, immunodeficiency is a rare cause of recurrent pyoderma. Thus, there are conflicting reports on the effect of the immune system on pyoderma and also on the appropriate diagnostic technique to evaluate it. This had probably prompted DeBoer (1995) to conclude in his review on pyoderma that, even if immune system was involved which most probably may be the case, it is very difficult to document it correctly as hundreds of individual components together comprise the entire immune system and very few of these can be measured. Therefore, the ability to assess a dog’s immunocompetence is very limited and not available to general practitioners.

However, the fact remains that there is most likely an alteration in the immune system status especially in deep pyoderma and study of the total leucocyte and lymphocyte counts, neutrophil function tests such as phagocytic activity, chemotaxis, total count, lymphocyte blastogenesis tests are some of the other parameters that will aid in the diagnosis along with immunological tests and more studies are warranted in this direction.

**ACKNOWLEDGEMENT**

The authors are thankful to The Dean, Veterinary College, Bangalore and KVAFSU, Bidar for providing facilities and financial support for carrying out the research work.

**REFERENCES**


Comparative Histomorphology and Histochemistry of Abdominal Aorta in Deccani Sheep and Bidri Goat

Sharanagouda, Ashok Pawar, Girish.M.H., Dilipkumar D and Shrikanth Kulkarni.
Department of Veterinary Anatomy and Histology
Veterinary College, KVAFSU, Nanadinagar, Bidar-585 401

ABSTRACT
Histologically Abdominal aorta of adult Deccani sheep and Bidri goat consisted of three layers, tunica intima, tunica media and tunica adventitia. Abdominal aorta was elastic type. Tunica intima consisted of a single layer of flattened endothelial cells, subendothelial layer and internal elastic membrane. Tunica media was thickest among the of three layers and was with well-defined elastic lamellae, lamellae were separated by circularly arranged smooth muscle, collagen fibers and reticular fibers. External elastic membrane was not distinguishable from many elastic layers in tunica media. Tunica adventitia was comprised of loose connective tissue and collagen fibers, elastic fibers, vasa vasorum and fibroblasts. Histochemically Abdominal aorta of both the species showed strong (++++) PAS reaction in tunica intima, moderate (+++) alcian blue (pH 1.0) reaction in tunica media and strong (+++) alcian blue (pH 1.0) reaction in tunica adventitia

Keywords: Abdominal aorta, Goat, Histology, Histochemistry, Sheep,

Abdominal aorta is made up of three layers, viz. tunica intima, tunica media and tunica adventitia (tunica externa) from inner to outer. The structure of abdominal aorta varies according to species. In the guinea pig and squirrel monkey it is elastic type (Awal et al. 2001; Rhodhin 2011) and transitional type in dog (Prodan et al. 2001). Abdominal aorta is a large conducting artery and details of its histological organization and histochemical reaction in Deccani sheep and Bidri goat are limited in literature reviewed. Hence, the present research work has been undertaken to study the histomorphology, histochemistry and to correlate any structural variations of Abdominal aorta in Deccani sheep and Bidri goat.

MATERIALS AND METHODS
The present study was carried out in the Department of Veterinary anatomy and Histology, Veterinary College, KVAFSU, Bidar, Karnataka. The material for the study was collected from eight adult Deccani sheep and Bidri goat immediately after slaughter from local slaughter houses. The collected tissue pieces were washed in normal saline and were fixed in different fixatives like Neutral buffered formalin, Bouin’s solution and Zenker’s solution. The tissue pieces were processed and embedded in paraffin by routine method. 4-6 µm thick sections were cut and utilized for histomorphological, histometrical and histochemical studies.

Various staining methods like Mayer’s haemalum –eosin-phloxine method, Mallory’s Phosphotungstic Acid Haematoxylin method for connective tissue and muscle fibers, Masson’s Trichrome method for connective tissue and muscle fibers, Van Geison’s stain for Collagen fibers, Gomori’s Aldehyde Fuschin method for Elastic fibers, Verhoeff’s method for Elastic fibers, Gomori’s method for Reticulum fibers, PAS-Alcian blue (pH 1.0) method for mucosubstances (Luna,1968), PAS method for mucosubstances (Singh and Sulochna,1996) were adopted to study the histology and histochemistry. Histometrical data was subjected to statistical analysis as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION
Abdominal aorta of adult Deccani sheep and Bidri goat consisted of three layers namely, tunica intima, tunica media and tunica adventitia (Fig.I and II). Total thickness of abdominal aortic wall and different layers were presented in (Table).These finding are similar to earlier reports of Awal et al. (2001) in guinea pig, Prodan et al. (2001) in dog, Vaish et al.

Table: Mean ± Standard error of thickness (µm) of total wall and different tunics of Abdominal aorta in adult Deccani sheep and Bidri goat.

<table>
<thead>
<tr>
<th></th>
<th>SHEEP</th>
<th>GOAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total wall</td>
<td>491.45 ± 18.20</td>
<td>534.92 ± 21.44</td>
</tr>
<tr>
<td>Intima</td>
<td>14.58 ± 0.54</td>
<td>15.17 ± 0.44</td>
</tr>
<tr>
<td>Media</td>
<td>394.85 ± 18.02</td>
<td>449.19 ± 20.89</td>
</tr>
<tr>
<td>Adventitia</td>
<td>82.02 ± 3.21</td>
<td>70.56 ± 5.74</td>
</tr>
</tbody>
</table>

Abdominal aorta of adult Deccani sheep and Bidri goat was an elastic artery. These findings are similar to the reports of Awal et al. (2001) in guinea pig and Rhodhin (2011) in squirrel monkey. However, present findings differed from the observation of Prodan et al. (2001) who had reported that abdominal aorta was transitional in dog.

Vaish et al. (2001) reported that the thickness of tunica intima was 11.02 ± 0.82 µm, tunica media layer was 518.51 ± 31.08 µm and tunica adventitia was 194.54 ± 2.54 µm in the abdominal aorta of adult goat. Tunica media was thickest among all the layers. However in the present study thickness of tunica intima was 14.58 ± 0.54µm, tunica media was 394.85±18.02 µm and tunica adventitia was 82.02 ± 3.21 µm in abdominal aorta of adult Deccani sheep, where as in adult Bidri goat it was 15.71 ± 0.44 µm,449.19 ± 20.89 µm and 70.56 ± 5.74µm respectively. There is a no significant difference between thickness of the individual layers and total wall thickness. The tunica media was thickest which is an agreement with Vaish et al., (2001) in goats and the greater thickness of tunica media is due to presence of smooth muscle fibers with numerous elastic fibers and collagen fibers.

Tunica intima of abdominal aorta consisted of flattened endothelial cells with simple squamous epithelium. Subendothelial layer was made up of predominately collagen, elastic, reticular fibers with distinct internal elastic membrane in adult Deccani sheep and Bidri goat(Fig I -VI). These findings are similar to the reports of Awal et al. (2001) in guinea pig, Vaish et al. (2001) in adult goat and Ogeng’o et al.(2010) in adult goat and partly in conformation with Prodan et al. (2001) who reported that there was ill defined subendothelial layer in dog in their study.

Tunica media of abdominal aorta consisted of well defined elastic lamellae with circularly arranged smooth muscle and collagen fibers and
membrane is not distinguishable from many thick elastic lamellae in adult Deccani sheep and Bidri goat (Fig I -VI). These findings are similar to earlier reports of Awal *et al.* (2001) in guinea pig, Prodan *et al.* (2001) in dog, Vaish *et al.* (2001) in adult goat and Rhodhin (2011) in squirrel monkey but for the difference in the number of elastic lamellae. The reticular fiber network around the collagen fiber and around the smooth muscle fibers in the present study are in partial confirmation with reports of Banks (1993) and Orsi *et al.* (2004) who reported variation of elastic lamellae in the abdominal aorta in dog.

16-18 number of elastic lamellae. Reticular fibers form a network around the bundle of collagen and individual smooth muscle fibers. External elastic membrane is not distinguishable from many thick elastic lamellae in adult Deccani sheep and Bidri goat (Fig I -VI). These findings are similar to earlier reports of Awal *et al.* (2001) in guinea pig, Prodan *et al.* (2001) in dog, Vaish *et al.* (2001) in adult goat and Rhodhin (2011) in squirrel monkey but for the difference in the number of elastic lamellae. The reticular fiber network around the collagen fiber and around the smooth muscle fibers in the present study are in partial confirmation with reports of Banks (1993) and Orsi *et al.* (2004) who reported variation of elastic lamellae in the abdominal aorta in dog.
Tunica adventitia of abdominal aorta contained loose connective tissue made up of collagen fibers with longitudinal arranged elastic fibers, vasa vasorum and fibroblasts in adult Deccani sheep and Bidri goat (Fig I - IV). These findings are similar to the earlier reports of Awal et al. (2001) in guinea pig, Prodan et al. (2001) in dog, Vaish et al. (2001) in adult goat, Ogeng’o et al. (2010) in adult goats and Rhodhin (2011) in squirrel monkey.

**Histochemistry:** Abdominal aorta of both the species showed strong (+++) PAS positive in the tunica intima indicates presence of mucosubstances and these findings are in agreement with reports of (Banks, 1993) that basement membrane below the endothelial lining was positive for PAS reaction. Moderate (+) alcian blue (pH 1.0) reaction in tunica media indicates presence of sulfated mucosubstances. These findings are in agreement with reports of Dellmann (2006) who stated that tunica media of elastic artery is with high quantity of sulfated glycosaminoglycans. In the present study strong (+++) alcian blue (pH 1.0) reaction in the tunica adventitia (Fig VII- VIII), is in agreement with reports of Bartholomev et al. (1983) who stated that tunica adventitia of bovine thoracic aorta showed strong (+++) alcian blue reaction because of high sulfated mucosubstances in this layer.

**CONCLUSION**

Abdominal aorta of Bidri Goat and Deccani sheep is an elastic artery and it contain more amount of elastic fibers compared to smooth muscle and collagen fibers. Elasticity of arteries depend up on amount of elastic fibers in the tunica media and arterial expansion is directly proportional to arterial elasticity and they serves as a conducting tubes. They also facilitate the movement of blood along the tube. Increase in the thickness of tunica intima and tunica media is an earlier sign of arthrosclerosis.

**REFERENCES**


A Study on Isolation of Mycoplasma from Cases of Avian Mycoplasmosis*

Mallinath¹ K.C. and Hari Babu² Y.
Department of Veterinary Microbiology Veterinary College Bidar-585401, India

ABSTRACT
The present study was undertaken to isolate the mycoplasma spp. from cases of avian mycoplasmosis. A total of three isolates of mycoplasma were obtained from 240 samples. Dehydrated mycoplasma broth and agar with 20 per cent horse serum and 10 per cent fresh bakers yeast extract and 0.2% glucose was found to be satisfactory for the isolation of mycoplasma in the laboratory. Morphologically a single type of mycoplasma species could be described which were further differentiated from Acholeplasma spp by using sodium polyanethol sulphonate (NPS) test, growth at 22°C and growth on media without serum tests. These isolates were then confirmed as M.gallisepticum by using growth inhibition test with known mycoplasma antiserum.

Key Words: Avian mycoplasmosis, Mycoplasma

Avian Mycoplasmosis is a complex, complicated and multifactorial disease posing a serious economic challenge to the prosperity of poultry enterprise in many parts of the world directly or indirectly resulting from high morbidity, poor feed conversion, decreased production, medication cost and high mortality when complicated with other infections.

Prevention of disease is the key for economical viability of commercial poultry (Dekich 1998). As it is costly disease it needs confirmed diagnosis for prevention and control. Though various tests are currently in use for the diagnosis of the disease however the mycoplasma must be isolated before any particular identification tests can be utilized. With the occurrence of false negative reactions and the most serious problem of false positive reactions in the rapid serum plate agglutination tests, the isolation remains a critical step. Though it is very difficult isolate mycoplasma under laboratory conditions, still the isolation of the organism is considered as ‘Gold Standard’ for the diagnosis of the disease. With the above concepts an effort has been made in the present study to isolate Mycoplasma from cases of Avian Mycoplasmosis.

MATERIALS AND METHODS
A total of 101 birds affected with Avian mycoplasmosis samples comprised of 101 lungs samples, 82 air sacs samples and 57 tracheal swabs collected in transport media and brought to laboratory over ice packs were screened for the isolation of mycoplasma. The samples were preliminarily processed in PPLO broth and then on PPLO agar with the supplementation of 20 per cent uninactivated horse serum, 10 percent of yeast extract (25%), 50 per cent glucose @ 0.2 % for primary isolation (Hari Babu et al., 1982) Fortified procaine penicillin (1000 IU/ml) @1% and 2.5% thallium acetate @ 2% was used in the primary broth culture to avoid the overgrowth of contaminating bacterial flora and 0.2% phenol red @ 1.5% was used as pH indicator in the broth culture. The broth culture showing, typical swirls after gentle shaking, slight change in the color of broth cultures towards yellowish and depicting a faint turbidity in the culture medium when incubated for 4-5 days of aerobic incubation at 37°C were suspected for the presence of mycoplasma organisms were inoculated onto the PPLO agar plates. The inoculated plates were incubated at 37°C under 5-10% CO₂ tension for 8-10 days before they were declared positive or negative. Each sample was sub cultured thrice before declaring it as negative.

The plates depicting the typical fried egg growth of organism were stained by Dien’s staining technique for colony morphology (Madoff 1968). Sodium polyanethol sulphonate (NPS) test using 5% NPS, growth at 22°C & 37°C and growth on media with or without serum tests were used to differentiate between Mycoplasm and Acholeplasma spp (Bishphing and Amtsberg, 1988)

* A part of M.V.Sc thesis submitted by the first to KVAFSU Bidar
1. Present Address: Scientist, SRDDL; IAH &VB; Bangalore, Karnataka, Email ID:mallinathkchoudapur@gmail.com
2. Director of Instruction (PGS); KVAFSU, Bidar, Karnataka
RESULTS AND DISCUSSION

In the present study out of 240 samples, three mycoplasma isolates were obtained. Dehydrated mycoplasma broth and agar supplemented with 20 per cent horse serum, 10 percent of yeast extract (25%), 50 per cent glucose @ 0.2 ml was found to be satisfactory for the isolation of mycoplasma from air sacs, lungs and tracheal swabs (Hari Babu et al., 1982, Hugar et al., 2004).

The addition of fortified procaine penicillin and thallium acetate in primary broth culture enhanced the growth of mycoplasma organisms by avoiding the overgrowth of contaminants.

The broth cultures indicative of mycoplasma growth when inoculated onto the plates containing PPLO agar media developed into colony only after eight to ten days of incubation. The isolates were identified by observing under light microscope to study the colony morphology after staining with Diens stain where in all the three isolates colonies with typical dense central nipple and light stained lace like granularity at the peripheral zone (Madoff, 1968).

The isolation rate of mycoplasma organisms was higher from infected samples when compared to noninfected samples (Garg and Sethi, 1969). The isolation rate recorded in the present study was hampered severely when the samples collected were stored at freezing temperature without processing for longer duration. (Moorthy and Spadbrow, 1976) Biddle et al., (2004)). The findings suggested that storage at freezing and thawing had negative impact on the recovery of mycoplasma organisms even from positive samples.

The results also indicated that the isolation of mycoplasma was more pronounced and efficient from the samples collected from the autopsied birds than the dead birds which could be attributed to processing of fresh samples soon after collection. Otherwise any delay in collection and processing of samples would affect isolation rate since mycoplasma are very fragile and fastidious.
By the time dead birds reached the laboratory they were at various stages of putrefaction as they would have died at least eight to ten hours earlier, this might be one of the factors for low percentage of isolation of mycoplasma from dead birds. Another factor could be the post-mortem invaders which mask the presence of mycoplasma after the death of bird which further make isolation impossible. (Moorthy and Spradbow, 1976).

The viability of these organisms gets reduced resulting in less or no chances of isolation as the time after death elapsed. The isolation of mycoplasma was very difficult because of the contaminants which outgrow the mycoplasma even in the presence of bacterial inhibitors in the media and the essential nutrients in media might have been used up by the contaminants.

In addition to all these, accumulation of metabolites in the media masks the survival of organisms even though samples contain mycoplasma in adequate numbers. Apart from media selected and nature of samples, antibiotics used in the treatment of Mycoplasma gallisepticum infection was also an important factor that interferes with successful isolation of the organism.

In the present study although many affected birds had typical lesions associated with avian mycoplasmosis the failure to isolate the mycoplasma could be due to antimycoplasmal drugs like tylosin routinely used in feed and water as prophylactic/therapy without confirming the disease. Above all even the presence of ammonium chloride in drinking water hinders the bacteriological recovery of the M. gallisepticum (Kempf, 1991; Branton et al., 1997). Growth inhibition noticed in sodium polyanethol sulphonate (NPS) test for all the three isolates indicated that the isolates were of Mycoplasma and not Acholeplasma.

The findings gave a clear cut demarcation for the differentiation between Mycoplasma and Acholeplasma (Kaur et al., (1998) and Sanjeevkumar et al., (2005). The isolates grew well at 37°C than 22°C and on media with serum than without it, indicating that they belonged to Mycoplasma spp and not to the Acholeplasma spp.

Growth inhibition test of the three isolates against the known antiserum raised in rabbits showed positive reactions with an inhibition zone of 2-3 mm in all the three isolates indicating that they belong to M. gallisepticum. (Hari Babu et al., (1982), Salem et al.,(1986) and Manohar et al., (2002))

REFERENCES


Kaur, C., Garg, D. N. and Kirchoff, H. (1998), First isolation of *Mycoplasma canadense* from milk of mastitic cows and buffalo in India. *Indian Veterinary Journal*. 75: 258-259


Biochemical and Immunological Identification of Mycoplasma Isolates from Poultry with Chronic Respiratory Disease*

Mallinath 1 K.C. and Hari Babu2 Y.

Department of Veterinary Microbiology Veterinary College Bidar-585401, India

ABSTRACT

The study was conducted to characterize the mycoplasma organisms isolated from birds with Chronic Respiratory Disease (CRD). A total of three isolates were considered for characterization under present study. Morphologically all the three isolates exhibited a similar type of colony features, biochemical studies also indicated similarity among the three isolates i.e., all of them fermented glucose non hydrolysed urea and arginine. Immunological studies were conducted on the isolates with growth inhibition test against known Mycoplasma gallisepticum antiserum along with other serological tests like AGPT, CIE, IE, and SRID. All the isolates exhibited positive reactions for all tests which confirmed isolates as Mycoplasma gallisepticum.

Key Words: Chronic Respiratory Disease, Mycoplasma, Poultry.

The commercial poultry industry is a modern day agricultural success due to popular consumer demand, healthy flocks and least cost of production. Prevention of disease is the key for economical viability of commercial poultry (Dekich 1998). Chronic Respiratory Disease is considered to be one of the most costly diseases, confronting the poultry industry in many parts of the world despite success in eliminating the disease in grand parent (GP) flock. As the disease cannot be eradicated prevention and control by early detection holds much promise in combating the losses expected. Therefore isolation and identification of the etiology is essential for achieving the ultimate aim of treating and preventing CRD. So an attempt is made in the present study to identify and characterize the mycoplasma spp isolated from birds with CRD.

MATERIALS AND METHODS

A total of 101 birds affected with CRD were screened for the purpose of isolation of mycoplasma spp. Isolation was carried out in the laboratory as per the procedure described by Haribabu et al., (1982), Hugar (2004).

Sodium polyanethol sulphonate (NPS), Growth at 22°C and Growth on media without serum tests were conducted so as to differentiate the isolates with that of Acholeplasma spp, as per the procedure given by Bisphing and Amtsbeg 1988 and Manohar et al. (2002). Growth inhibition test was also carried out with a known mycoplamsa antiserum for identification of the isolates by the method described by Clyde, (1964).

Biochemical Characterization of the glucose breakdown, urea hydrosis and arginine hydrolysis tests as per the standard procedure described by Carmichael et al., (1972). The antiserum used for various tests, was raised against known antigen in New Zealand white rabbit as per the procedure of Haribabu, (1995). AGPT, CIE, IE and SRID tests were carried out as procedures of Outerlony (1962), Uppal et al., (1983) for immunological characterization of the isolates.

RESULTS AND DISCUSSION

Out of 101 birds screened for isolation of mycoplasma spp, a total of three isolates were obtained in pure culture as per the procedures cited above. Growth inhibition noticed in Sodium polyanethol sulphonate (NPS) test for all the three isolates indicated that the isolates were of Mycoplasma and not Acholeplasma. The findings gave a clear cut demarcation for the differentiation between Mycoplasma and Acholeplasma. The findings was in accordance with Kaur et al., (1998) and Sanjeevkumar et al., (2005). Similarly the Growth at 22°C and Growth on media without serum tests showed that the isolates were of Mycoplasma spp. Growth inhibition test of the three isolates against the known antiserum raised in rabbits shown positive reactions with an inhibition zone of 2-3 mm in all the three isolates. The
findings were in accordance with Hari Babu et al., (1982), Salem et al., (1986) and Manohar and Moorthy, (2002).

Biochemical studies of all the three mycoplasma isolates of avian origin revealed that they were similar in their biochemical activity i.e., all the isolates were positive for glucose breakdown test and none hydrolyze arginine and urea. These findings indicated that the cultures were pure and belonged to single species of mycoplasma and the observations were in accordance with Katoch and Chandiramani, (1984) Ronglian et al., (1996) Manohar and Moorthy, (2002).

The serological test for identification of the isolates was done by employing agar gel precipitation test with the known antiserum. All the three isolates showed precipitation bands. The findings were in agreement with Sahu and Olson, (1976) and Nanomura and Yoder, (1977).

The identification of isolates was also done by counter immunoelectrophoresis (CIE) with known antiserum against and the whole cell antigen of mycoplasma isolates. All the three isolates developed clear precipitation lines within 40-50 minutes in one per cent agarose gel in Vernol buffer (pH 8.6) and the observation was in agreement with Uppal et al., (1983). It was observed that CIE is 16 times more sensitive than AGPT in detection of mycoplasma infections hence the test could be used for diagnostic purpose (Phildoff and Onoviron, 1979).
Plate No. 4. SRID test with Mycoplasma isolate No.1, 2 and 3. C = Control

Immunoelectrophoresis (IE) was carried out with whole cell antigen of isolate No. 1 against the test antiserum, IE test showed a clear distinct arc of precipitation bands at the base of the trough containing antiserum and the findings were similar to the observations of Thirkill and Kenny, (1975), Awati, (2003) and Hugar, (2004).

Single radial immunodiffusion (SRID) was done by using test antiserum. All the three isolates developed precipitation rings around the wells which were of different diameters indicating the variation in the protein concentration of the antigen. The observations were similar to that of Awati, (2003) and Hugar, (2004).

The serological tests conducted on all the three isolates using hyperimmune serum raised against known antigen showed similar results indicating that the isolates belonged to the same species of mycoplasma i.e., *M. gallisepticum* which is an important pathogenic mycoplasma causing chronic respiratory disease in Poultry.

REFERENCES


Induction of Estrus by Oral Progesterone in Postpartum Anoestrus Osmanabadi Goats During Non Breeding Season

Bjurkar, R. G.*, Krishnaswamy, A.1, Honnappa, T. G.2, Murthy, C.3, Jayashankar, M. R.4, and Jayakumar5
Dept. of Veterinary Gynaecology and Obstetrics, Veterinary College, Karnataka Veterinary Animal &Fisheries Sciences University, Bidar-585401

ABSTRACT
Efficacy of Medroxy progesterone acetate (MPA) to induce estrus in postpartum anoestrus condition was studied in ten does against equal number non-treated control group. MPA was fed orally for 6 days and the goats were followed for heat detection during the next 5 days. None of the MPA treated doe exhibited estrus activity up to 5 days after treatment. Similarly, none of the goat in control group exhibited estrus. The serum progesterone concentration remained at basal level (0.33 to 0.67 ng/ml) throughout the period of treatment and also during the post treatment period. The biochemical profiles of serum calcium, serum phosphorous, serum cholesterol and serum total protein were also not significantly influenced by the treatment.

Key words: Postpartum anoestrus, MPA, Osmanabadi goats

MATERIALS AND METHODS
Ten Osmanabadi goats of 2-3 year age diagnosed as postpartum anoestrus of at least 60 days were fed orally with 5 mg of (MPA) daily for six days. The goats were followed for heat detection during the next 5 days. None of the MPA treated doe exhibited estrus activity up to 5 days after treatment. Similarly, none of the goat in control group exhibited estrus. The serum progesterone concentration remained at basal level (0.33 to 0.67 ng/ml) throughout the period of treatment and also during the post treatment period. The biochemical profiles of serum calcium, serum phosphorous, serum cholesterol and serum total protein were also not significantly influenced by the treatment.

RESULTS AND DISCUSSION
In the present study, MPA was administered to 10 Osmanabadi goats with a minimum duration of 60 days postpartum anoestrus period. MPA was administered daily orally @ 5 mg for 6 days. None of the animals evidenced any sign of estrus after the discontinuation of oral feeding of progesterone. Therefore, daily oral feeding of 5 mg of MPA for 6 days was found to be ineffective in terminating the...
anoestrus period. The serum progesterone concentration remained at basal levels throughout the period of treatment and during the post treatment period (Table). This observation suggests that oral feeding of 5 mg of MPA does not ensure adequate progesterone levels to suppress the hypothalamo pituitary axis and ensure a feedback mechanism following its withdrawal.

Traditional treatments that apply progesterone for long period (Corteel, 1988) did not take in to account the current knowledge of follicular dynamics in sheep and goats. Now, it is well documented that a follicular pattern of wave emerges every 5 to 7 days in small ruminants (Rubianes and Menchaca, 2003) and it is suggested that in seasonal anoestrus ewes and goats, the use of long treatment is not justified.

The results of the present study is in agreement with the reports of Goswami et al. (1998) who also found that, 5 mg of MPA was ineffective in terminating the anoestrus period. In view of the observations made in the present study, MPA may have to be administered in higher doses as has been used in sheep (Evans et al., 1962; Hinds et al., 1964; Lindsay et al., 1967) for elucidating some response.

The biochemical profiles of serum calcium, serum phosphorous, serum cholesterol and serum total protein were also not significantly influenced by the oral feeding of 5 mg of MPA. Their concentrations were well within the physiological limits both in control group as well as in the MPA treated group during and after treatment (Table). In contrast to the observations made in the present study, Singh et al. (1994) and Patil et al. (2000) reported that progesterone treatment employed for synchronization of estrus in Osmanabadi goats significantly elevated serum cholesterol concentration during the treatment period in goats.

CONCLUSION

Daily oral feeding of 5 mg of MPA for 6 days was found to be ineffective in terminating the anoestrus period in treatment group because none of the animals evidenced any sign of estrus after the discontinuation of oral feeding of progesterone. The serum progesterone concentration remained at

Table : Serum Progesterone, Calcium, Phosphorous, Cholesterol and Total Protein concentration before, during and after MPA therapy in postpartum anoestrus does.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Before treatment</th>
<th>During treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Progesterone (ng/ml)</td>
<td>MAP</td>
<td>0.42±0.02</td>
<td>0.48±0.03</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.42±0.01</td>
<td>0.45±0.02</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>MAP</td>
<td>9.29±0.01</td>
<td>9.30±0.01</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>9.30±0.01</td>
<td>9.29±0.01</td>
</tr>
<tr>
<td>Phosphorous (mg/dl)</td>
<td>MAP</td>
<td>4.63±0.09</td>
<td>4.62±0.10</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>4.58±0.10</td>
<td>4.61±0.10</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>MAP</td>
<td>93.07±0.71</td>
<td>94.61±0.78</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>92.04±1.21</td>
<td>92.71±0.99</td>
</tr>
<tr>
<td>Total Protein (g%)</td>
<td>MAP</td>
<td>7.77±0.28</td>
<td>7.65±0.09</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>7.97±0.30</td>
<td>7.80±0.21</td>
</tr>
</tbody>
</table>

The values bearing common superscript are statistically not significant (P>0.05)
basal level (0.33 to 0.67 ng/ml) throughout the period of treatment and during the post treatment period. The biochemical profiles of serum calcium, serum phosphorus, serum cholesterol and serum total protein was also not significantly influenced by the oral feeding of MPA.

REFERENCES


In-vitro Evaluation of Four Insecticides for Controlling Haematobia irritans (Horn Fly)

Mohammad Dawood Bawer, Placid E.D Souza, Pradeep B.S1 and Ansar Kamran2 C.
Centre of Advanced Faculty Training, Dept of Veterinary Parasitology, Veterinary College, KVAFSU, Bangalore-24

ABSTRACT

Haematobia irritans flies were collected from naturally infested cattle in different farms from in and around Bangalore city. They were reared in the laboratory to study the bionomics and efficacy of four selected insecticides viz. cypermethrin, fenvalerate, propoxur and indispron D-110 in in-vitro trials. Propoxur indicated a good efficacy against horn flies followed by cypermethrin, Indispron D-110 and fenvalerate

Key words: Cypermethrin, Fenvalerate, Haematobia irritans, Indispron D-110. Propoxur

Haematobia irritans (horn) flies belonging to the family Muscidae are one of the most important obligate blood-sucking pests of pastured cattle and buffaloes in many parts of the world and occasionally infest other animals including humans closely associated with bovines causing anemia, reduced weight gain and general weakness. Control of horn flies are recommended when 100 – 200 horn flies per cattle are present.

Although resistance was recorded in the areas where Haematobia is distributed, chemicals remain the primary control tactic. Both the pyrethroids and organophosphates have a useful place in a control programme, provided that adequate epidemiological data is available. Since the horn fly menace was high in some of the farms, a study was undertaken to evaluate four different compounds in vitro.

MATERIALS AND METHODS

In the present study, some of the insecticides commonly used against arthropod pests and are currently available in the market viz. Cypermethrin (Tickcide®, AGV- Vet Pharmaceuticals, BYR. IND. Estate, Bangalore), Fenvalerate (Ticomax. Ivorychem, India P. Limited, Bangalore), Propoxur (Bolfo powder Bayer Polychem India Ltd, IDA Kothur, Mahabubnagar, AP) and one new biocide Indispron D-110 which contains a water dispersible form of hexa methyl disilazane (4%) a reaction product of synthetic amorphous silica were evaluated for their efficacy in controlling horn flies.

Different concentration of insecticides viz. cypermethrin (0.7µg/cm², 1.5µg/cm² and 3.15µg/cm² of filter paper), fenvalerate (1.5µg/cm², 3.15µg/cm² and 6.2µg/cm² of filter paper), Propoxur (25mg, 50mg and 75mg) and Indispron D -110 (0.25ml, 0.5ml, 1ml and 2ml) were made for use in in vitro trials.

Method of assay: The susceptibility of horn fly population was assessed by using impregnated filter paper bioassays to evaluate the efficacy of above insecticides. No.1 Whatman filter papers were laid into petridishes and treated with 1ml of desired concentrations of cypermethrin, fenvalerate, propoxur dissolving in acetone and Indipson D-110. Then it was kept for three hours for drying (Antonio et al., 2002). The filter papers were kept in petridishes (9cm ×1.5cm) in which small holes were made at the top of the petridish to permit fly loading. Then the flies were transferred in to it and observations were made.

Filter papers treated with 1ml acetone were used as controls. After exposure to the insecticide, mortality was assessed for a period of two hours. Percentage mortality data was analyzed by Abbott’s formula as per Bagherwal et al., (1995).

\[
\text{Efficacy\%} = \frac{\text{Number of dead flies – Control mortality}}{\text{Number of used flies – Control mortality}} \times 100
\]

The LC₅₀ was determined by Probit analysis software.

1 Corresponding author drpradeepvet@gmail.com. Assistant Professor, Dept of Veterinary Parasitology, Veterinary College, Bidar, Nandinagar, KVAFSU, Bidar- 585401.

2 Department of Veterinary Medicine, Veterinary College, KVAFSU, Bangalore-24
RESULTS AND DISCUSSION

In the study, 100 per cent mortality of flies was observed at higher concentration of cypermethrin (3.15µg/cm²), 80 per cent and 50 per cent mortality were observed at 1.5 µg & 0.7µg concentrations respectively without any mortality in the control group. The LC₅₀ was found to be 0.7µg/cm² (Fig.1).

The use of Fenvalerate resulted in 80 per cent mortality at a high concentration of 6.2µg/cm². However 60 per cent of flies died at a concentration of 3.15µg /cm² and 20 per cent of flies at a lower concentration of 1.5µg /cm². The LC₅₀ concentration for fenvalerate was recorded as 2.57µg/cm² (Fig. 2).

In this study, 100 per cent mortality of flies was observed at higher concentration (75 mg) of Propoxur. Similarly 90 % and 50 % mortalities were observed at 50mg and 25mg concentrations.

The LC₅₀ was found to be 0.39 mg /cm² with no mortality in the control group during the period of study (Fig. 3).

In this study, 100 per cent mortality of flies was observed at higher concentration (75 mg) of Propoxur. Similarly 90 % and 50 % mortalities were observed at 50mg and 25mg concentrations.

The efficacy of Indispron D-110 at 0.25 ml, 0.5 ml, 1 ml & 2 ml concentrations was studied against horn flies following a 4 hr period of exposure. 100 per cent mortality of flies was noticed at a higher dose of 2 ml, 90 per cent mortality with 1ml, 70 per cent mortality with 0.5ml and 40 per cent mortality at the low dose of 0.25ml. The LC₅₀ was found to be 0.0051ml/cm². No mortality was observed in the control group during the study (Fig.4)

In the present study the laboratory bioassay of cypermethrin against horn fly revealed LC₅₀ as 0.7µg/cm² whereas Gugielmone (1999) reported a higher LC 50 of cypermethrin on horn flies from Santa Fe Provence, Argentina where the flies were
exposed to different concentrations of cypermethrin ranging from 0.0 (control) to 3200µg/cm² diluted in acetone on filter paper (9 cm diameter) in petridish for 2 hours. The difference could be due to reduced efficacy of cypermethrin against the horn flies in this particular geographic area.

Guglielmone et al. (2001) recorded the LC 50 of cypermethrin on horn flies exposed to various concentrations of cypermethrin on filter paper for 2hrs as ranging from 1.05 to 142.4/cm² which was much higher than the result of present study indicating the resistance of Haematobia irritans flies to cypermethrin in different regions.

The LC50 of fenvalerate observed in the present study 2.57µg/cm² was more than that reported in similar trials conducted by Sheppard and Joyce in 1992. In contrary, Burg et al. (1995) reported a comparatively higher LC50 of fenvalerate indicating a different status of efficacy.

The studies on efficacy of Indispron D-110 against horn flies following 4 hours of exposure with 2 ml, 1 ml, 0.5 ml and 0.25 ml revealed 100%, 90%, 70% and 40% mortality of horn flies respectively. The LC50 was calculated as 0.0051 ml/cm².

Pradeep (2009) reported 100 % efficacy of different doses (0.5ml, 1ml and 2ml) of Indispron D-110 in in-vitro trials against larvae and nymphs of R. sanguineus and B. microplus after 24 hrs of exposure. In the present study, the efficacy of the new silica based compound classified as a biocide against horn flies is being reported for the first time. However this compound containing Hexa Methyl Disilazane 4% is recommended for application on the surface or sheds by the manufacturer but not on the animals.

ACKNOWLEDGEMENT
The authors are thankful to PNP Associates, Faridabad, Haryana for supplying Indispron D-110 and the ICAR, Centre of Advanced Faculty Training, New Delhi for their facilities to conduct the work.

REFERENCES


Prevalence of Subclinical Mastitis in Organized Farms in and around Bangalore*

Sripad K1, Upendra H.A2, Srikrishna Isloor3 and Yathiraj S4
Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar

ABSTRACT

Mastitis, remains as a serious problem in dairy industry since several decades and more so is the subclinical mastitis (SCM). In SCM, as no changes could be observed either in the affected animal / udder / milk, it could only be diagnosed by laboratory test/s. The present study was taken up to determine the prevalence of subclinical mastitis in five organized farms located in and around Bangalore. Two hundred thirty nine animals under study were grouped based on the breed, age and number of lactations. Based on estimation of Electrical conductivity (EC), somatic cell count (SCC) and N-acetyl β D glucosaminidase (NAGase), prevalence of SCM was determined for each breed, age group and lactation. It was observed that overall prevalence of SCM based on EC, SCC and NAGase activity were 77.41, 55.65 and 68.62 per cent respectively. Prevalence of SCM in dairy cows was high in HF and Jersey cross breeds as compared to the local Sahiwal breed. The percentage prevalence of SCM increased with the increase in the age of the animals and was highest in dairy cows aged 8 years and above. In the current study the prevalence of SCM was lowest in the first lactation and increased with the increase in the number of lactation. Highest percentage prevalence of SCM was noticed in third and fourth lactations.

Key words: Bovine, Prevalence, Subclinical mastitis.

MATERIALS AND METHODS

The Two hundred thirty nine apparently healthy cows belonging to five organized dairy farms from various geographic locations in and around Bangalore formed the source of animals for the study. Animals were grouped based on the breed, age and number of lactations. Prevalence of SCM was determined based on estimation of Electrical conductivity (EC), somatic cell count (SCC) and N-acetyl β D glucosaminidase (NAGase) activity in milk.

EC was determined by using Milk checker (Eisai Co. Ltd. and Orient Instruments Ltd., Tokyo, Japan) and a value more than 6.5 mS/cm was considered as positive for subclinical mastitis (Swarup et al., 1989). SCC was estimated using Nucleocounter (Chemo Metec, Denmark) and a value > 5.00 Lakhs/ml of milk was taken as criteria to declare the milk / animal as subclinically mastitic / infected (Narayana and Iya, 1954). NAGase enzyme was estimated as per the method described by Kitchen and Middleton (1976) and an OD value of 0.27 at 405 nm, equivalent to 14.04 micromoles/min /ml was taken as the cut off value to declare the animal as positive for SCM. Results were analyzed by using Graph Pad Prism Version 5.

RESULTS AND DISCUSSION

Overall Prevalence of SCM: It was observed that overall prevalence of SCM based on EC, SCC and NAGase activity were 77.41, 55.65 and 68.62 per cent respectively. This observation of overall prevalence based on SCC is in corroboration with...
the observations made by earlier workers (Guha and Gera, 2001, Chahar et al., 2005 and Samanta et al., 2006). Devi et al., 1997 and Bhoyar et al., 2009 have observed higher prevalence of SCM ranging from 61.11 to 75.31 per cent whereas Tiwari et al., 2000, De and Mukherjee, 2009, recorded lower prevalence.

The prevalence of SCM among apparently healthy cows may be attributed to the latent infection which may be due to the colonization of mastitigenic agents in the teat canal. Similar opinion is expressed by Guha and Gera, (2001). Wide variation in the percentage prevalence of SCM observed by previous workers could be due to the difference in the manegamental condition and different diagnostic tests employed (Kader et al., 2002). It could also be due to breed of the animal, immune response of animals and climatic condition (Bachaya et al., 2005). Further these studies have been conducted in different geographical areas and that can be another reason for recording different percentage prevalence of SCM by some of the earlier workers.

Breedwise prevalence of SCM: In the present study, the prevalence of SCM in dairy cows was high in HF and Jersey crossbred breeds as compared to the local Sahiwal breed and same was true for all the three diagnostic tests employed (Table 1). Similar observation was made by Awasthi and Upadhyay, (2006). Higher prevalence of SCM in crossbred cows draws support of Tiwari et al. (2000) and Almaw et al. (2009), De and Mukherjee (2009) and Rady and Sayeed (2009). However Rahman et al. (2009) and Islam et al., (2010) reported no significant difference in the prevalence of SCM among HF, Jersey and Sahiwal breed of cows.

Table 1. Percent Prevalence of SCM in Jersey, Holstein Friesian (HF) and Sahiwal breeds of dairy cows

<table>
<thead>
<tr>
<th>Screening Test</th>
<th>Jersey</th>
<th>HF</th>
<th>Sahiwal</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC (mS/cm)</td>
<td>63.24(43)</td>
<td>62.50(5)</td>
<td>82.52(118)</td>
</tr>
<tr>
<td>SCC (L/ml)</td>
<td>63.24(43)</td>
<td>54.54(78)</td>
<td>62.50(5)</td>
</tr>
<tr>
<td>NAGase (µmoles/min/ml)</td>
<td>91.17(62)</td>
<td>56.64(81)</td>
<td>87.50(7)</td>
</tr>
<tr>
<td>No. of animals (n)</td>
<td>68</td>
<td>143</td>
<td>08</td>
</tr>
</tbody>
</table>

Figure in the parenthesis indicate number of animals positive for SCM.

This observation of higher prevalence of SCM in HF and Jersey crossbred cows as compared to local breed may be because of the difference in milk yield, udder size, breed susceptibility, milking practice or genetic factors, as opined by Awasthi and Upadhyay (2006), Almaw et al. (2009) and De and Mukherjee (2009).

Agewise prevalence of SCM: The percent prevalence of SCM based on all the three diagnostic tests, increased with the increase in the age of the animals and was highest in animals aged 8 years and above (Table 2). The observation of increased prevalence of SCM with age and highest prevalence in older cows draws support from Shettabk et al. (1995), and Rahman et al. (2009). Our observation of higher prevalence of SCM in the older age group, differed from that of Rady and Sayeed, 2009 and Islam et al., (2010).

Table 2: Percentage prevalence of SCM in different age groups

<table>
<thead>
<tr>
<th>Screening Test</th>
<th>2–4 years</th>
<th>4–6 years</th>
<th>6–8 years</th>
<th>&gt;8 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC (mS/cm)</td>
<td>66.67(22)</td>
<td>66.67(48)</td>
<td>85.53(65)</td>
<td>86.21(50)</td>
</tr>
<tr>
<td>SCC (L/ml)</td>
<td>24.24(8)</td>
<td>54.17(39)</td>
<td>60.52(46)</td>
<td>68.97(40)</td>
</tr>
<tr>
<td>NAGase (µmoles/min/ml)</td>
<td>35.35(13)</td>
<td>65.78(47)</td>
<td>75.00(57)</td>
<td>81.03(47)</td>
</tr>
<tr>
<td>No. of animals (n)</td>
<td>33</td>
<td>72</td>
<td>76</td>
<td>58</td>
</tr>
</tbody>
</table>

Figure in the parenthesis indicate number of animals positive for SCM.

The higher prevalence of SCM in older animals than in younger cows could be attributed to suboptimal defence mechanism as indicated by Dulin et al. (1988) and cellular senescence which makes the older animals more susceptible for infection (Akbar et al., 2004). In addition, prior exposure to the mastitis causing pathogens and accumulation of subclinical infection or carrier stage, might be the other reason for the observation of increased prevalence of SCM in aged animals as opined by Workineh et al. (2002).
Lactation wise prevalence of SCM: In the current study the prevalence of SCM based on all the three diagnostic tests, was lowest in the first lactation (Table 3) which is in agreement with the observations made by Zahid, 2004 and increased with the increase in the number of lactation which corroborates with the reports of earlier workers namely, Devi et al. (1997) and Sudhan et al. (2005). In the present study, the prevalence of SCM was highest in third (based on EC and SCC) and fourth lactation (based on NAGase estimation). This observation is in agreement with Shettbakk et al., 1995 and Chahar et al., 2005. However, this finding failed to agree with the findings of Sudhan et al. (2005) and Mustafa et al. (2007) who reported higher prevalence of SCM in 5th and 6th lactation and Islam et al. (2010) who reported highest prevalence of SCM in the parity group of more than eleven.

Table 3: Percentage prevalence of SCM in dairy cows in different lactations

<table>
<thead>
<tr>
<th>Screening Test</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC (mS/cm)</td>
<td>71.83(51)</td>
<td>78.46(51)</td>
<td>84.44(38)</td>
<td>75.00(21)</td>
<td>71.43(10)</td>
</tr>
<tr>
<td>SCC (L/ml)</td>
<td>42.25(30)</td>
<td>47.69(31)</td>
<td>68.89(31)</td>
<td>57.14(16)</td>
<td>50.00(7)</td>
</tr>
<tr>
<td>NAGase (µmoles / min/ml)</td>
<td>56.34(40)</td>
<td>72.31(47)</td>
<td>75.55(34)</td>
<td>82.14(23)</td>
<td>64.28(9)</td>
</tr>
<tr>
<td>No. of animals (n)</td>
<td>71</td>
<td>65</td>
<td>45</td>
<td>28</td>
<td>14</td>
</tr>
</tbody>
</table>

Figure in the parenthesis indicate number of animals positive for SCM.

The variations observed in the prevalence of SCM in different lactations by earlier workers could be due to the longer exposure period to infectious agent due to loosening of sphincter muscles of the teat in the advanced age (FAO, 1989). An increase in the prevalence of SCM with increase in the number of lactations could be associated with gradual loss of immune response, which makes it susceptible to infection and may also be associated with inefficient sphincters (Sudhan et al., 2005). The low prevalence of SCM among primiparous / heifers could be because of better polymorphonuclear leukocyte function in them than in multiparous cows. Comparatively better PMN function is directly associated with the higher resistance to the infection in primiparous / heifers vis a vis their multiparous counterparts (Samanta et al., 2006). The defence mechanism in multiparous / aged cows is poor and milk production is more. But prevalence of SCM is directly influenced by production (Dulin et al., 1988). This may be another reason for higher prevalence of SCM in multiparous cows.

REFERENCES


Plasma Triglyceride Levels at Various Ages and Physiological Stages in Gir Cattle and Jaffarabadi Buffaloes

Ninan Jacob and Arya, J.S.

ABSTRACT

Plasma triglycerides (mg/dl) level was estimated in females (n=8 for each sampling stage) at 1 wk, 1, 3, 6, 12, 24 and 36 months age, at 1, 2 and 3 month of lactation and in non-lactating pregnant and non-pregnant animals and in males (n=6 for each sampling stage) at 1 wk, 1, 3, 6 and 12 month of age and in bulls of Gir and Jaffarabadi breeds. The plasma triglycerides (mg/dl) level varied significantly (P < 0.05) between ages in both males and females, between sexes, between various physiological stages (lactation, pregnant, non-pregnant) in females, between bulls and castrated male animals and between the two species studied.

Key words: Ages, Gir, Jaffarabadi, Physiological stages, Plasma triglycerides,

The role of livestock in the development of Indian economy is multiple with an overall contribution of 3.26% to the GDP in 2008-09 (Gorti et al., 2012). As per the livestock census of 2007, Gir cattle constituted 13.99 lakh of the total 79.75 lakh cattle of Gujarat and Jaffarabadi buffaloes constituted 14.70 lakh of the total 87.73 lakh buffalo population of Gujarat (Gswan, 2011). Gir cattle, one of the best dairy cattle breeds of the country and Jaffarabadi buffalo, noted for its higher fat content and milk production (Gajbhiye et al., 2007), originally belonged to Saurashtra region of Western Gujarat. There exists many physiological and biochemical differences between the buffaloes and cattle which are reflected through their production and reproduction performances and varies during growth of the animal. Triglycerides are an integral part of lipids and vary depending on the factors such as species, age, sex and physiological stage of the animal. The main storage forms of Long Chain Fatty Acids (LCFA) are the triacylglycerols (also called Triglycerides) in which three LCFA are esterified to glycerol. Triglycerides are bound to proteins in complexes called lipoproteins for transport through plasma. They are synthesised mainly in liver, adipose tissue, mammary gland and small intestine. In adipose tissue the synthesis of triglycerides is regulated by hormones glucagon, catecholamines and insulin (Bruss, 2008). The role of triglycerides in gestation and lactation in cows was reported by Puppione et al. (1980). However, Williams (1989) was of the opinion that triglyceride levels are not related to resumption of post-partum ovarian cyclicity and they donot appear to play a direct regulatory role in ovarian steroidogenesis. The concentration of serum triglyceride varies during pregnancy, at calving and thereafter (Guedon et al., 1999). Lactation decreased triglyceride values and the levels were highest in mature non pregnant lactating buffaloes (Lapitan et al., 2008). There seems to be a paucity of literature regarding the detailed triglyceride values of Gir cattle and Jaffarabadi buffaloes at different ages and productive stages. Moreover there is no comparative study for the plasma triglyceride levels between cattle and buffaloes. Considering the above points the present study was proposed to be undertaken in Gir cattle and Jaffarabadi buffaloes.

MATERIALS AND METHODS

The study was carried out during the months of October to December, on male and female Gir cattle and Jaffarabadi buffaloes of various ages and physiological stages maintained under standard feeding and management conditions at the Cattle Breeding Farm, Junagadh Agricultural University, Junagadh district, Gujarat state, India. The project was approved by the Institutional Animal Ethics Committee (IAEC). The blood samples (2ml; n=270) were collected aseptically through jugular venipuncture using lithium heparin vacuettes from Gir and Jaffarabadi females (n=8 for each sampling
results and discussion

The level of plasma triglycerides at different ages in Gir cattle and Jaffarabadi buffaloes is presented in Table 1.

**Between different ages:** The level of plasma triglycerides (mg/dl) at different ages ranged from 16.92 ± 0.73 (3 m lactation) to 35.49 ± 1.79 (12 m age) in Gir females and from 17.75 ± 1.05 (1 m age) to 24.53 ± 1.04 (6 m age) in Gir males. In females, the values decreased significantly (P < 0.05) from 1 wk to 3 m of age. The value at 12 m was double than at 6 m age. In Gir males, the levels at 1 wk, 1, 3 and 12 m were not significantly different. The value observed in males at 6 m age was significantly (P < 0.05) higher than that observed at other ages.

In Jaffarabadi, plasma triglycerides (mg/dl) across all ages ranged from 19.49 ± 0.81 (3 m age) to 28.39 ± 1.64 (36 m age) in females and from 14.44 ± 0.83 (12 m age) to 23.95 ± 1.42 (1 m age) in males. In Jaffarabadi females, significant (P < 0.05) decrease was found in the levels from 1 wk to 3 m age. The values from 6 m to 24 m age showed a non-significant increase over the value obtained at 3 m age. The levels at 36 m was significantly (P < 0.05) higher than the levels recorded at all other ages studied. In Jaffarabadi males the level at 12 m age was significantly (P < 0.05) lower than that at 1 wk, 1, 3 and 6 m age.

**Between different sexes:** Significantly (P < 0.05) lower values were observed at 1 wk, 1 and 12 m age whereas significantly (P < 0.05) higher values were noted at 3 and 6 m age in Gir males as compared to Gir females. Significantly (P < 0.05) higher level was observed at 1 m and significantly (P < 0.05) lower level was observed at 12 m in Jaffarabadi males as compared to that in females.

**Between the two species:** On comparing the values between females of the two species, the values observed in Gir at 1 wk, 1 and 12 m age were

| Table – 1: Plasma triglycerides (mg/dl) levels at different ages in Gir cattle and Jaffarabadi buffaloes (Mean ± S.E.). |
|---|---|---|---|---|---|---|
| Age Animal | Wk | Months | 1 | 1 | 3 | 6 | 12 | 24 | 36 |
| G | F | 30.42<sub>st</sub> ± 2.01 | 24.50<sub>sst</sub> ± 1.42 | 16.92<sub>sst</sub> ± 0.73 | 17.79<sub>sst</sub> ± 1.04 | 35.49<sub>sst</sub> ± 1.79 | 26.6<sub>st</sub> ± 1.57 | 28.04<sub>st</sub> ± 1.87 |
| | M | 19.81<sub>mnvy</sub> ± 0.96 | 17.75<sub>mnvy</sub> ± 1.05 | 20.13<sub>mnvy</sub> ± 1.11 | 24.53<sub>mnvy</sub> ± 1.04 | 17.76<sub>mnvy</sub> ± 0.95 | - | - |
| J | F | 23.98<sub>s</sub> ± 1.42 | 20.01<sub>s</sub> ± 0.90 | 19.49<sub>s</sub> ± 0.81 | 21.63<sub>s</sub> ± 1.23 | 21.26<sub>s</sub> ± 1.25 | 21.68<sub>s</sub> ± 1.25 | 28.39<sub>s</sub> ± 1.64 |
| | M | 22.67<sub>p</sub> ± 0.51 | 23.95<sub>p</sub> ± 1.42 | 18.01<sub>p</sub> ± 1.19 | 21.97<sub>p</sub> ± 1.19 | 14.44<sub>p</sub> ± 0.83 | - | - |

**Note:** Means having the same superscript do not differ significantly from each other (P<0.05).

**F (female): n = 8 at each stage ; M (male): n = 6 at each stage**

G – Gir  J – Jaffarabadi  P – Pregnant  NP – Non-Pregnant
significantly (P < 0.05) higher and that at 3 and 6 m age were significantly (P < 0.05) lower than that in Jaffarabadi. As compared to Jaffarabadi males, Gir males exhibited significantly (P < 0.05) lower levels at 1 wk and 1 m age and then significantly (P < 0.05) higher levels from 3 m to 12 m age.

Between lactating animals and between non-lactating animals: (Table 2): In Gir cattle, the values observed at 1 and 3 m lactation were significantly (P < 0.05) lower than the value at 2 m age. Among non-lactating Gir the levels in non-pregnant females were significantly (P < 0.05) lower than that in pregnant females.

Table – 2: Plasma triglycerides (mg/dl) levels at different physiological stages in Gir cattle and Jaffarabadi buffaloes (Mean ± S.E.).

<table>
<thead>
<tr>
<th>Age</th>
<th>Lactation month</th>
<th>Non Lactating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>15.75^b</td>
<td>20.66^a</td>
</tr>
<tr>
<td></td>
<td>± 0.56</td>
<td>± 1.12</td>
</tr>
<tr>
<td>J</td>
<td>17.36</td>
<td>16.77</td>
</tr>
<tr>
<td></td>
<td>± 1.31</td>
<td>± 0.95</td>
</tr>
</tbody>
</table>

Note: Means having the same superscript do not differ significantly from each other (P<0.05).

In Jaffarabadi buffaloes, no significant differences were noted between the levels at various months of lactation studied. Similarly non-significant difference was recorded between non-pregnant and pregnant non-lactating Jaffarabadi females.

A comparison between the different lactating months of the two species revealed that at 2 m lactation the levels in Gir cattle were significantly (P < 0.05) higher than that in Jaffarabadi buffaloes. Further comparison between the non-lactating stages of the two species revealed that the levels in non-lactating pregnant Gir females were significantly (P < 0.05) higher than that in Jaffarabadi buffaloes.

Between adult males (Bulls and castrated): (Table 3): In Gir cattle, the levels recorded in castrated males and bulls were similar to that observed at 3 m and 6 m age, respectively. The levels in castrated males were significantly (P < 0.05) lower than that in bulls. In Jaffarabadi males, the level observed in bulls was similar to the level in growing males at 3 m age. Gir bulls exhibited significantly (P < 0.05) higher levels of triglycerides as compared to Jaffarabadi bulls.

Table – 3: Plasma triglycerides (mg/dl) levels in adult males of Gir cattle and Jaffarabadi buffaloes Mean ± S.E.).

<table>
<thead>
<tr>
<th>Animal</th>
<th>Bulls</th>
<th>Castrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>25.22^c ± 1.22</td>
<td>21.54^a ± 1.01</td>
</tr>
<tr>
<td>J</td>
<td>19.32^b ± 0.68</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Means having the same superscript do not differ significantly from each other (P<0.05).

In the present study were in the range reported by Dhami et al. (2005) in female HF cattle and Puppione et al. (1980) in Holstein cows. The values in pregnant and lactating Gir cows obtained in our study were higher than that reported by Dhami et al. (2005) and Bosoglu et al. (1998) in Swiss brown cows. Differences between different ages and sexes in Gir cattle observed in our studies could not be compared due to lack of literature on similar lines.

Significant effect of age and sex obtained in our studies in Jaffarabadi buffaloes were not in agreement with the findings in buffalo calves (upto seven months of age) of Sivakanesan and Mariathanasan (1997) and in Iranian water buffaloes by Tajik and Nazifi (2011). The values observed in our study at lactation were lower than that at pregnancy in both the species, which was in agreement with the findings of Lapitan et al. (2008). The rest of the values especially the study...
between Gir cattle and Jaffarabadi buffaloes remain uncompared due to scanty literature on this line of study. The current observations in Gir cattle and Jaffarabadi buffaloes could serve as a basis for future reference on similar studies. The plasma profile of triglycerides reflects lipid metabolism in the body particularly in mammary glands of ruminants (Guedon et al., 1999) during lactation and can be a good probe to guide clinician towards improving postpartum fertility in female bovines.

ACKNOWLEDGEMENTS
The authors are thankful to the authorities of Anand Agricultural University and Junagadh Agricultural University for granting the permission and facilities to conduct the research work at the Cattle Breeding Farm, J.A.U., Junagadh. The authors are especially grateful to Dr. Gajbhiye, P.U., Research Scientist, CBF, J.A.U. and to Dean, College of Veterinary Science & A.H., J.A.U. for all the help provided.

REFERENCES


A Study on Emergence of Culicoides Species in Bidar*

Satheesha S. P, Udupa K. G.1 and Thimma Reddy P.M.2
Veterinary College, Bidar. Karnataka.

ABSTRACT

Pattern of emergence of Culicoides species at different breeding sites in Nandi nagar, Bidar was studied using a collapsible tent type emergence trap placed over the different habitats. The tent was found to be more suitable for studying the emergence of Culicoides in field conditions over different habitats and may be suitable for all seasons. Three trials were conducted to study the pattern of emergence of Culicoides species at different breeding sites with the different days of application of the trap. In the first trial, only C. imicola emerged from the margin of drainage near cattle shed. A total of 12 midges emerged during the period of 28 days of trap application. Second trial of emergence on the wet fertile area near the cattle shed yielded both C. imicola and C. oxystoma during the observation period of 56 days. When the trap was applied on the water logging areas, only C. oxystoma was found to be emerged. Thus, breeding habitats such as drainage, wet and fertile soil were found to be suitable for breeding of both Culicoides imicola and C. oxystoma based on the trapping of emerging Culicoides using emergence trap. Emergence of both these species and possibly other species can be expected throughout the year, thus, building up of population of Culicoides species locally. However, continued monitoring for emergence of Culicoides over a period of year/years at different habitats may yield clarity in the dynamicity of emergence.

Key words: Breeding habitat, Culicoides, Emergence trap.

The genus Culicoides consists of a large number of species which are distributed worldwide they are common ectoparasites of animals and man causing great annoy through their bites. In addition to this, some species are vector for filarial worms, protozoan parasites and viruses. (Blanton and Worth 1979; Lane 1983; Boorman 1989; El Sinnary and Hussein 1980; Mellor and Pitzolis 1979; Nevill et al., 1992; Nevil and Nevil, 1995; Mellor, 1996). The larval habitat of Culicoides constitutes one of the main factors contributing to the density of Culicoides population (Braverman 1978). Bhoyar, 2003 reported that, C. imicola and C. oxystoma were the dominant species in Bidar district of, Karnataka, based on their presence throughout the year with higher abundances over other species. Since, common species are more apt to be important vectors than uncommon species; a study has been conducted on emergence of these species to know the possible breeding sites of Culicoides species. Further necessary action can be taken for its control.

MATERIALS AND METHODS

The emergence of Culicoides midges was studied by using a collapsible, semi automatic tent type emergence trap (figure 1), which was fabricated as per the design described by Pajor (1987). The trap is prepared in a pyramidal in shape, with a floor area of one square meter and a height of 800 mm with collecting bottle at the top. The four sides of the tent were equally triangular prepared with nylon nets approximately one meter in length. The angle between the ground and the side of tent is 55-60°. About 75mm wide cloth was used as a skirt at the base of the tent which enabled the trap to be closed off more effectively towards the uneven terrain. The trap was fixed to the ground by eight small tent pegs, one at each corner and one in the middle of each side. These pegs were passed through eyelet protected holes in small projecting tags. A central pole was placed to keep the tent upright. The top of the trap was fixed with a collar having a diameter of 90mm, and then fixed to the ground with the pegs. The skirt was either pushed into the ground, if it was muddy or otherwise arranged in such a way that the trap was well closed off.

*part of M.V.Sc. thesis work submitted by the first author to KVAFSU Bidar.
1.Professor and Head, Dept. of Teaching Veterinary Clinical Complex, Veterinary College, Shimoga, Karnataka.
2.Professor and Head Department of Veterinary Parasitology, Veterinary College, Hassan, Karnataka.
The collecting bottle having capacity of 2.5 liters was filled with about 170ml of collecting fluid (normal saline + Savlon®). Then, it was placed on top of the trap with the plastic supporting collar pushed as far as possible into the emergence chimney. All positive photoactive insects were able to fly or crawl to the top of the tent, through the collar and the emergence chimney and then they enter the collecting bottle and move further upwards towards the light. A portion of collecting fluid was found to be condensed inside the bottle. The insects either got trapped in this moist layer and slide downward into the collecting fluid or fell directly into it. The trap was kept erect for varying period from 7 days to 56 days in three different trials. The samplings of emerging Culicoides were done at every week intervals during the period of each operation.

The collection of emerged Culicoides was done as follows: the collecting bottle was removed with a slight twisting movement and the opening at the top of the trap quickly to prevent insects from escaping from the tent. The collecting fluid in the bottle was gently swirled to trap living insects and to concentrate all the catches in the fluid. The fluid was quickly poured, through the neck of the bottle in to the empty container. The collecting bottle was refilled with collecting fluid and replaced on top of the trap.

The Culicoides were collected and washed in normal saline and stored in 70 per cent ethyl alcohol after counting of species abundance along with their sex in each collection. The species of midges were identified based on wing pattern. The confirmation of species was done by sending the mounted slides to Onderstepoort Veterinary Institute, Onderstepoort South Africa (OIE Reference laboratory for Bluetongue).

**Culicoides imicola Kieffer:** Culicoides imicola is a well marked, medium to small sized species of Inimola complex group in the subgenus Avaratia. Wings are with large interconnected pale spots mostly touching wing margin. Post- stigmatic pale spot in cell R5 is large and quadrate, covering distal half of second radial cell and being continuous with pale streak on vein M1. Distal pale spot in cell R5 is also large, quadrate and continuous with pale streak on vein M1, broadly touching the wing margin. Columnar darkish area between post stigmatic pale spot and distal most pale spot in cell R5 is thicker though attenuated in the middle. Cell M1 is having two pale spots. Distal one is more elongated down to wing margin and also to vein M2. Pale spots in the cell M2 is in the form of a long streak while that in cell M4 covers distal half of the cell touching wing margin very broadly. Vein tips are always dark. Radial vein distally divides forming into two small sized radial cells. The male Culicoides midges are having long antennae which are feathery or plumose. The abdomen of male midges is slender and terminally bears prominent male genitalia (Urquhart et al. 1987; Wirth, and Hubert, 1989; Kettle, 1995 and Dasgupta, 1995) (figure 2). The nulliparous (figure 3) midges have been identified based on the absence of burgundy red pigment lining the abdominal wall of Culicoides midges as described by Dyce (1969).
**Culicoides oxystoma** Kieffer: *Culicoides oxystoma* is a medium sized dark gray midge of the *Schultzei* group of subgenus *Oecacta*. Wings are with marked, small and isolated pale spots, except in its basal area, while large pale area is inconspicuous. Pale spot in cell R5 is very much specific, as distal most bilobed pale spot touches the wing margin and 2 or 3 other well formed pale spots precedes the bilobed spots. Radial vein is unbranched. Radius meets costa at a sharp angle and the probable area of second radial cell is covered by very darkish spot (Stigmatic spot) and these are highly characteristic of *Schultzei* group. Pale spot in cell M4 is large occupying almost the entire cell and apices of vein M2, M3+M4 and Cu1 are pale. The identification of males (figure 4), nulliparous (figure 5) *C. oxystoma* is made based on the characteristics similar to that of *C. imicola*.

**RESULTS AND DISCUSSION**

The emergence trap was applied near different breeding sites in Veterinary College campus, Bidar. The type of habitat, days of application of emergence trap, the species emerged at different intervals and the rate of emergence per day were recorded and presented in the Table.

A total of 03 trials of emergence of *Culicoides* were conducted with different days of application. In the first trial, the tent type emergence trap was erected near the margin of drainage of cattle shed and was kept for 28 days from 7th December, 2004 to 6th January, 2005 for collection of emerging *Culicoides*. Only *C. imicola* was found to emerge during this period. A total of 12 *C. imicola* midges were collected in 28 days and rate of emergence of this species per day was 0.43. Among the midges emerged, number of males and females were found to be 07 and 05 respectively giving a male to female ratio of 0.71:1.

In the second trial, trap was assembled on the wet fertile area used for growing fodder beside the cattle shed. The trap was held for 56 days from 21st January, 2005 to 24th March, 2005 for the collection of emerging midges of *C. imicola* and *C. oxystoma*. The number of *C. imicola* and *C. oxystoma* emerged were 491 and 07 respectively. Among *C. imicola*, the numbers of male and female midges were 40 and 451 respectively. Male to female ratio was found to be 0.09:1. In case of *C. imicola*...
### Table: Pattern of emergence of *Culicoides* species collected using emergence trap at different breeding sites in Veterinary college campus, Bidar.

<table>
<thead>
<tr>
<th>Trial No.</th>
<th>Place of application</th>
<th>Number of days of application</th>
<th>Weeks of collection</th>
<th><em>C. imicola</em></th>
<th><em>C. oxystoma</em></th>
<th>Rate of emergence per day*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
<td>M</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>Margin of drainage near the cattle shed</td>
<td>28</td>
<td>1st week</td>
<td>04</td>
<td>03</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd week</td>
<td>02</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3rd week</td>
<td>05</td>
<td>03</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4th week</td>
<td>01</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>12</td>
<td>07</td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>Constant wet fertile area by the side of cattle shed</td>
<td>56</td>
<td>1st week</td>
<td>38</td>
<td>32</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd week</td>
<td>67</td>
<td>57</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3rd week</td>
<td>46</td>
<td>41</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4th week</td>
<td>70</td>
<td>63</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5th week</td>
<td>205</td>
<td>190</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6th week</td>
<td>51</td>
<td>49</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7th week</td>
<td>21</td>
<td>19</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8th week</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>498</td>
<td>451</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Water logging areas</td>
<td>07</td>
<td>1st week</td>
<td>41</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>41</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>

*Note: M = Males, F = Females

*Rate of emergence per day was calculated by dividing the total number of midges emerged in a trial by the number of days of application of the trap in that trial.

oxystoma, only 06 females and 01 male were emerged giving a male to female ratio of 0.17:1. The rate of emergence of *Culicoides* irrespective of species was found to be 8.89 per day. The emergence was found to be highest during the 5th week of setting of emergence trap.

The third trial was conducted during the period from 30th March, 2005 to 6th April, 2005 on a breeding habitat having water logged areas and it was covered by the shade of trees. The emergence trap was held only for one week during which period a total of 41 midges of *C. oxystoma* were found to emerge and rate of emergence per day was found to be 5.86. The numbers of female and male midges emerged were 34 and 07 respectively and the male to female ratio was found to be 0.21:1.

The trap is a collapsible, semiautomatic, tent type and was found to be most suitable for collection of emerging *Culicoides* midges. As narrated by Pajor (1987), found to be cheaper, needs no electricity and can be continuously kept erected for longer periods for midges’ collection. He also opined that minimum shading effect of the trap in the area covered was not seriously altered the ecology and continuous breeding of *Culicoides*. Thus, the tent was found to be more suitable for studying the emergence of *Culicoides* in field conditions over different niches and may be suitable for all seasons.

In the first trial, only *C. imicola* emerged from the margin of drainage near cattle shed. In the second trial of emergence on the wet fertile area near the cattle shed yielded both *C. imicola* and *C. oxystoma* during the observation period of 56 days. However, since only a small abundance of emergence of *C. oxystoma* was there in this catch and absence of this species in the first trial shows that, these sites was more suitable for *C. imicola* rather than *C. oxystoma*. *Culicoides imicola* is known to breed in wet soil containing organic material and can spread over an extensive area (Braverman 1978). When the trap was applied on the wet area due to water logged areas, only *C. oxystoma* was found to be emerged with a higher rate of emergence per day (5.86). Braverman et al. (1985) reported that *C. imicola* breeds in and around animals’ pen, water trough overflows, at margin of animal sewages and drainage canals and around the puddles created by leakages of water canals. *Culicoides oxystoma* was found to breed in sites as drainage canals which generally contain less organic matter than breeding sites of *C.*
**imicola**. A study conducted by Dasgupta (1962) using soil samples collected near stock ponds and banana vegetations for the detection of emergence of *Culicoides* midges in the laboratory conditions indicated emergence of one or more species of imaginal forms of *Culicoides* species from a single soil sample. Similar observations were observed in the present study. Since the sites around the cattle shed are continuously been wet and fertile due to drainage, the emergence of both *C. imicola* and *C. oxystoma* and possibly other species can be expected throughout the year, thus, building up of population of *Culicoides* species locally. Al-Busaidy and Mellor (1991) opined that unless there is local vector population and suitable breeding site present, the bluetongue virus will die out. During the second trial of emergence study, a sharp increase of emergence of *C.imicola* was found in almost middle (5th week) of the collection period. Similar pattern of emergence was reported by Dasgupta (1962). However, continued monitoring for emergence of *Culicoides* over a period of year(years) at different habitats may yield clarity in the dynamicity of emergence.

**ACKNOWLEDGEMENT**

The authors are very much thankful to Ms. Karien Labuschagne, and Mr. G.J. Venter, Dept. of Entomology, Onderstepoort Veterinary Institute Onderstepoort, South Africa, for their kind help in identifying the *Culicoides* midges.

**REFERENCES**


Alkaline Phosphatase and Gamma Glutamyl Transferase as Early Indicators of Renal Failure in Canine Patients

Shivakumar.M., Ansar Kamran C1, Phaniraj K.L and Priyanka.
Veterinary College, Hassan

ABSTRACT

The usefulness of urinary Alkaline Phoshatase (AP) and Gamma Glutamyl Transferase (CGT) as early indicators in 40 dogs with acute renal failure (G II) and 96 dogs suffering from chronic renal failure(GIII) and 30 apparently healthy dogs (GI) was conducted, urine was collected from these dogs and was subjected to urinary GGT, AP and Creatinine estimation. The mean urine GGT and AP values were significantly higher in group I as compared to group II and III. There was no significant difference between the mean values of GGT and AP among group II and III canine patients.

Key words: Alkaline Phoshatase, Canine patients, Gamma Glutamyl Transferase,

The common clinicopathologic markers (e.g., serum creatinine and blood urea nitrogen), the kidney disease is recognized only in the maintenance phase and when clinical signs are overt. At this point, more than 80-90% of the kidney function is already lost (Lefebvre and Watson, 2005). In the present days, attention has been directed toward evaluation or urinary enzymes as diagnostic markers of nephropathies (Emeigh Hart, 2005). Hence, the Present paper describes about the evaluation on the usefulness of urinary enzymes as early indicators of renal failure in canine patients.

MATERIALS AND METHODS

One hundred and thirty six dogs that were showing the history and clinical findings of renal failure were considered for the study. Confirmatory diagnosis of renal failure was done based on the plasma creatinine concentration and differentiation from pre and post renal azotemia was done according to the standard procedure (Antognoni, et.al. 2007). Differentiation of Acute and Chronic renal failure patients was done by following the standard protocol (Whittemore et al., 2003) and classified 40 dogs as acute renal failure (Group II) and rest 96 animals as chronic renal failure (Group III) cases. Thirty healthy animals belonging to the different age group served as healthy control (Group I).

RESULTS AND DISCUSSION

A total of 166 canine patients (ARF = 40, CRF = 96, Healthy = 30) were selected for the present study and the results obtained are presented in the Table. The mean urine gamma glutamyl transferase (GGT) values in Group I patients was significantly higher than that recorded in other groups (Group II and Group III). Similarly, mean urine Alkaline Phosphatase (AP) levels in the Group I dogs were also higher than other two groups. However, there was no significant difference in the mean enzyme values for GGT and AP between Group II and Group III.
Table: Urine enzyme values in different groups

<table>
<thead>
<tr>
<th>Urine Enzymes (U/L/mg% Ucrt)</th>
<th>Group I n=30</th>
<th>Group II n=40</th>
<th>Group III n=96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Phosphatase</td>
<td>11.93±1.15a</td>
<td>1.51±0.03b</td>
<td>1.45±0.17b</td>
</tr>
<tr>
<td>Gamma Glutamyl Transferase</td>
<td>11.50±0.95a</td>
<td>1.58±0.04b</td>
<td>0.54±0.14b</td>
</tr>
</tbody>
</table>

Mean values bearing the same superscript in the row do not vary significantly (P < 0.01)

Enzymes from damaged cells of many organs are released into the serum and are measured for diagnosis of dysfunction of the specific organ, no reliable serum enzyme assay can detect renal damage. Serum enzymes are not filtered in the glomerulus because of their large molecular weight, therefore, urine enzyme activity is a sure indication of renal tubular activity, leakage or necrosis (Antognoni et al., 2007 and Scally et al., 2006). Brush border enzymes and lysosomal enzymes are evaluated for detection of renal damage. Increased urine GGT values in acute renal failure patients correlates well with the findings of many workers (Emeigh Hart, 2005 and Lees et al., 2005). Urinary enzymes excretion, mainly the brush border and lysosomal enzymes should be considered as due to an impairment of the cellular structure of the renal tubules and as an early biochemical index of kidney damage (Antognoni et al., 2007). Many workers stated that detection of enzymes such as GGT and NAG in the urine has proved to be a sensitive indicator of renal tubular damage (Adin and Cowgill, 2000 and Sato, 2002). Wolfgang (1972) reported enhanced activities of alkaline Phosphatase (AP) in rats following toxic or shock induced kidney damage. Present study also recorded increased urine mean AP values in acute renal failure patients. Urine enzyme measurement is a non-invasive procedure used to assess renal tubular cell integrity. Many reports indicated that the urine enzymes (AP, GGT and NAG) are sensitive indicators of renal damage, in particular tubular lesions. Significantly low enzyme values in chronic renal failure patients compared to acute renal failure patients was recorded in the present work. The enzyme values in chronic renal failure patients was slightly higher than those in normal dogs and was however, statistically not significant. This is justified by many workers (Antognoni and Cowgill, 2000 and Scally et al., 2006), they also observed significant difference between acute renal failure and chronic renal failure patients but not between chronic renal failure patients and normal dogs. This could be further supported by the opinion of Heiene and Co-workers (1991), they opined that in chronic renal damage, urine enzymes are depleted as the renal tubules are destroyed causing a decrease in urine enzyme output. Although many new biomarkers like Cystatin – C are being evaluated for their diagnostic value, cost and standardization for canine patients is the major drawback in their clinical application.

CONCLUSION

From the present study it can be concluded that Urine Gamma Glutamyl Transferase and Alkaline Phosphatase can be used as the early indicators of renal failure in canine patients.

REFERENCES


Trends and Prospects of Poultry Production-A Study in Karnataka

Mohan Kumar1 H.T. and Jayarama Bhat1 B.

ABSTRACT

A study was carried to understand the growth and growth dynamics of the poultry in Karnataka. Data for the period 1984 to 2010 were collected from the Department of Animal Husbandry and Veterinary Services and the growth rate is computed. The growth of layers over the entire period has been spearheaded by improved birds with desi birds not growing at all. The production of eggs has been growing at a slightly slower pace (3.32%) than the production of poultry meat (4.06%). Kopala has replaced Bellary district as the largest producer of eggs in the state whereas with regard to meat production it is concentrated in and around Bangalore urban district. Consumption of poultry meat is gaining importance at the cost of cattle meat. Egg production is likely to reach 35,000 lakhs eggs and meat production to about 21,000 metric tonnes by the year 2015. The rise in the demand of poultry products supports the future prospects of the poultry production.

Key words: Karnataka, Poultry production

The poultry in India is growing at a fast pace primarily due to the demand and full support by a supply-push on account of the introduction of technology and institutional changes that are taking place by way of contract farming. Karnataka is a leading producer of poultry meat which is growing over several other types of meat. Studies have shown that the consumption of Non vegetarian products is growing. In some products the production has not been able to keep pace with demand resulting in a rise in the prices. Poultry production by virtue of a short production cycle has been able to respond to the rising demand and the supply has responded fairly swiftly easing the prices. However the steep rise in the input prices has taken its toll and poultry meat and egg prices have gone up due to the inevitable cost push inflation.

India's broiler production grew by about 18% to 2.47 million tonnes in 2012 (FAO), due to the larger availability of feed and the growing demand for poultry meat in response to affordable prices and rising consumer income. The per capita consumption of poultry meat in India stood at 2.1 kg in 2012. A trend towards forward integration in poultry operations, rowing farmer preference for birds with higher dressing yields, and price stabilization measures initiated by the industry are also the factors supporting production growth.

The four southern states, viz. Andhra Pradesh, Karnataka, Kerala and Tamil Nadu account for about 45 percent of the country's egg production, with a per capita consumption of 57 eggs and 0.5 kg. of broiler meat. The eastern and central regions of India account for about 20 percent of egg production, with a per capita consumption of 18 eggs and 0.13 kg of broiler meat. The northern and western regions of the country record a much higher figure of 52 eggs and 2.5 kg of broiler meat than the eastern and central regions with respect to per capita availability of eggs and broiler meat. (Mehta and Nambiar, 2002.)

In this study an attempt has been made to study the growth of the poultry industry in Karnataka, the dynamics of meat production and forecast the production scenario into the year 2015.

MATERIALS AND METHODS

The poultry industry produces two main products, eggs and meat. The former is produced by desi and improved birds while the latter is mainly accounted by improved broiler chicks. A peculiar feature of the composition of layers is that after 2002-03 had suddenly dropped to half and that is why the study has created two periods. The modernization of the poultry egg production was witnessed in the year 2003-04 with the improved stock dominating the production base.

Data were collected from the publications of the Department of Veterinary and Animal Husbandry, Government of Karnataka. Data

---

1 Ph.D scholar, Kuvempu, University, Jnanasahyadri, Shankaragatta, 577451.
2 Professor of Economics, Kuvempu University, Jnanasahyadri, Shankaragatta, 577451
pertained to the period 1984-85 to 2009-10. A growth equation is used to compute the compound growth rate of each series under study. The linear trend equation is used to project the various parameters of the industry by linear extrapolation.

The dynamics of meat production in Karnataka has been analyzed using Markov chain analysis for the period 1999 to 2010. The transition probability matrix was computed using a Minimization of Absolute Deviation (MAD) estimator in the Linear Programming Framework. (Lee et al, 1970.)

RESULTS AND DISCUSSION

Egg production: The growth of the vital parameters of poultry production in Karnataka is presented in Table 1. The data reveal that in period 1, improved bird grew at the rate of 6.03 percent per annum, while desi layer birds grew at the rate of 3.74% which dropped to 1.81% in the period 2003-04 to 2009-10. In the latter period the growth of improved bird numbers was a staggering 9.8% per annum. The number of layer birds is growing at the rate of 6.42 percent per annum. The yield of desi birds is also found to be declining at the rate of 0.56 percent per annum. On the other hand the yield of improved birds is growing at the rate of 0.47% in the second period.

In the study, Table 1 reveals that egg production in Karnataka has been rising at the rate of 3.32 percent for the entire period. The same was 4.17% and 8.38% during period 1 and period 2, respectively. The corresponding figures for desi birds were 2.58% and 1.94% and for improved birds it is 5.61% and 10.31%, respectively.

The average district wise production of poultry eggs is presented in Table 2. Kopala recorded a seven fold increase in the production of eggs. Davengere recorded a threefold increase and replaced Bellary which was the largest producer of eggs in the year 2002-03. Bangalore rural was also displaced from the second place to seventh place and recorded a 45% decline in egg production. Mysore, Raichur and Bagalkot recorded significant increases in production. In the state as a whole egg production increased from 19,927 lakh eggs to 29,083 lakh eggs in the year 2009-10.

Table 2: District wise production of eggs in Karnataka

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>District</th>
<th>2002-03</th>
<th>2009-10</th>
<th>Net (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kopala</td>
<td>1016</td>
<td>7973</td>
<td>684.74</td>
</tr>
<tr>
<td>2</td>
<td>Davangere</td>
<td>952</td>
<td>4093</td>
<td>329.94</td>
</tr>
<tr>
<td>3</td>
<td>Bellary</td>
<td>2448</td>
<td>3658</td>
<td>49.43</td>
</tr>
<tr>
<td>4</td>
<td>Mysore</td>
<td>885</td>
<td>2331</td>
<td>163.39</td>
</tr>
<tr>
<td>5</td>
<td>Bagalkot</td>
<td>607</td>
<td>1899</td>
<td>212.85</td>
</tr>
<tr>
<td>6</td>
<td>Haveri</td>
<td>880</td>
<td>967</td>
<td>9.89</td>
</tr>
<tr>
<td>7</td>
<td>Bangalore Rural</td>
<td>1739</td>
<td>959</td>
<td>-44.85</td>
</tr>
<tr>
<td>8</td>
<td>Raichur</td>
<td>185</td>
<td>756</td>
<td>308.65</td>
</tr>
<tr>
<td>9</td>
<td>Kolar</td>
<td>673</td>
<td>735</td>
<td>9.21</td>
</tr>
<tr>
<td>10</td>
<td>Chitradurga</td>
<td>834</td>
<td>544</td>
<td>-34.77</td>
</tr>
<tr>
<td>11</td>
<td>Others</td>
<td>9708</td>
<td>5168</td>
<td>-46.77</td>
</tr>
<tr>
<td>Total</td>
<td>19927</td>
<td>29083</td>
<td>45.95</td>
<td></td>
</tr>
</tbody>
</table>

Source: Department of Veterinary & Animal Husbandry, Govt. of Karnataka

Meat Production: The number of animals slaughtered has been quite sluggish growing at the rate of 0.69% for period 2. However yields of meat have been growing at the rate of 4.23% per annum for the period. This has led to a matching increase in the production. The output of poultry meat has
far exceeded the growth of total meat production in the state.
District wise poultry meat production in Karnataka is presented in Table 3 in two periods from 2002-03 to 2009-10.

Table 3: District wise production of poultry meat in Karnataka

<table>
<thead>
<tr>
<th>Sl No</th>
<th>District</th>
<th>2002-03</th>
<th>2009-10</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bangalore Urban</td>
<td>421</td>
<td>5555</td>
<td>1219.48</td>
</tr>
<tr>
<td>2</td>
<td>Hassan</td>
<td>429</td>
<td>1511</td>
<td>252.21</td>
</tr>
<tr>
<td>3</td>
<td>Kolar</td>
<td>638</td>
<td>1429</td>
<td>123.98</td>
</tr>
<tr>
<td>4</td>
<td>Mandya</td>
<td>640</td>
<td>1393</td>
<td>117.66</td>
</tr>
<tr>
<td>5</td>
<td>Davangere</td>
<td>545</td>
<td>1290</td>
<td>136.70</td>
</tr>
<tr>
<td>6</td>
<td>Tumkur</td>
<td>530</td>
<td>1237</td>
<td>133.40</td>
</tr>
<tr>
<td>7</td>
<td>Bangalore Rural</td>
<td>1267</td>
<td>1121</td>
<td>-11.52</td>
</tr>
<tr>
<td>8</td>
<td>Mysore</td>
<td>576</td>
<td>1011</td>
<td>75.52</td>
</tr>
<tr>
<td>9</td>
<td>Dakshina Kanada</td>
<td>643</td>
<td>627</td>
<td>-2.49</td>
</tr>
<tr>
<td>10</td>
<td>Haveri</td>
<td>464</td>
<td>545</td>
<td>17.46</td>
</tr>
<tr>
<td>11</td>
<td>Bellary</td>
<td>1232</td>
<td>523</td>
<td>-57.55</td>
</tr>
<tr>
<td>12</td>
<td>Others</td>
<td>6390</td>
<td>3478</td>
<td>-45.57</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>13775</td>
<td>19720</td>
<td>43.16</td>
</tr>
</tbody>
</table>

Source: Department of Veterinary & Animal Husbandry, Govt. of Karnataka

The poultry meat production in Bangalore Urban stood first with a 12 fold increase in production from 421 metric tonnes in 2002-03 to 5555 metric tonnes in the year 2009-10 (Table 3). Hassan followed with an increase of 252.21% to 1511 metric tonnes. Kolar, Mandya, Davangere and Tumkur were the other major producers which registered more than 100% growth during the period under reference. Bangalore Rural which stood first in the year 2002-03 had been displaced due to a 11.52 percent decline in poultry meat production.

Dynamics of meat production in Karnataka: Let us observe the following figure

The figure 1 shows the domination of sheep and goat together accounting for 60% of the total production. Poultry accounted 13% and bovine meat accounted for 21% of the total. The scenario changed somewhat in the year 2007-10 as shown in figure 2.

The figure shows poultry meat accounted for 16%, while sheep and goat accounted for less at 53%. Pig meat accounted for more at 10% and bovine meat remained stable at 21%.

In order to study how changes are taking place in the production scenario of meat in Karnataka a Markov Chain analysis is carried out for data from Karnataka. The dynamics of the change, in other words the changing importance of production is studied using Markov chain analysis and the estimated transition probability matrix is presented in Table 4.

Production was stable in sheep and goat with a retention probability of 0.6713 and 0.5927 (Table 4) Pig meat has the highest stability of 0.7334. Poultry had a retention probability of 0.3612. This implies that poultry meat production was not stable with a high
probability of losing its importance to bovine with a combined switching probability of about 0.3. At the same time cattle meat show a high switching probability of 0.5976. This shows that poultry meat production is gaining importance over cattle meat. The switching behavior captured by the transition probability matrix has resulted in the growth of poultry meat production in the state which is depicted in figure 3. This is a validation of the transitions captured by the transitional probability matrix.

**Fig. 3: Actual and Predicted Production of Poultry Meat in Karnataka**

<table>
<thead>
<tr>
<th>Year</th>
<th>Layers (lakh)</th>
<th>Yield (Kg/year/bird)</th>
<th>Egg Production (lakh)</th>
<th>Meat Production (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desi</td>
<td>Improved</td>
<td>Total</td>
<td>Desi</td>
</tr>
<tr>
<td>2010-11</td>
<td>52.63</td>
<td>92.98</td>
<td>145.62</td>
<td>97.29</td>
</tr>
<tr>
<td>2011-12</td>
<td>53.52</td>
<td>99.58</td>
<td>153.10</td>
<td>97.32</td>
</tr>
<tr>
<td>2012-13</td>
<td>54.40</td>
<td>106.17</td>
<td>160.57</td>
<td>97.36</td>
</tr>
<tr>
<td>2013-14</td>
<td>55.28</td>
<td>112.77</td>
<td>168.05</td>
<td>97.39</td>
</tr>
<tr>
<td>2014-15</td>
<td>56.16</td>
<td>119.37</td>
<td>175.53</td>
<td>97.43</td>
</tr>
</tbody>
</table>

Now, it can be concluded from the study indicated that the growth of poultry layers over the entire period (1985-2003 and 2003-2010) was led by the production of improved birds and there was a perceptible decline in the contribution of desi birds. Kopala has replaced Bellary district as the largest producer of eggs in the state whereas with regard to meat production it is concentrated in Bangalore urban district. When the composition of meat was studied, it was observed that the production of poultry meat has been growing and is gaining at the cost of cattle meat and its share in the total meat production has increased from 13% to 16%. This

CONCLUSION

The population of desi birds is expected to remain more or less constant at 56 lakh birds while the number of improved birds will increase to 119 lakh birds from the present population of 90 lakh birds. The yield of eggs is not expected to rise very significantly in the coming years. Egg production is expected to touch 35,000 lakh eggs by the year 2014-15 from a little over 27,000 lakh eggs currently.

Turning to poultry meat production the numbers of birds are not likely to increase from the current level of 125 lakh birds, but due to the higher productivity, from 1.51 to 1.64 Kg per bird the total output will increase to 20,889 metric tonnes in the year 2014-15. However it is in the region of 19,000 metric tonnes at present.
perhaps is due to the social taboo attached to consuming beef and the Government’s ban on the slaughter of cows in Karnataka. Forecasts of egg production reveals that the production is likely to reach 35,000 lakhs eggs and the production of meat to about 21,000 metric tonnes by the year 2015.

REFERENCES
Characterization of Lactic Acid Bacteria Obtained from Dahi Sample of Agricultural Zones of Karnataka

Rajasekhar.P *, Prabha, R., Ramachandra, B., Suchitra, N and Manjunatha, H.
Department of Dairy Microbiology, Dairy Science College, Karnataka Veterinary Animal Fisheries Sciences University, Hebbal, Bangalore-24

ABSTRACT

Dahi is a thick, sour, well known fermented milk product of Indian household having heterogenous lactic acid bacteria. Lactococci, streptococci, leuconostoc, pediococci, lactobacilli are the common lactic acid bacteria found in dahi. Temperature and inoculum majorly influence dahi preparation. The present study contributes to know about type of the microflora of dahi (50 samples, 5 from each zone) available in ten agricultural zones of Karnataka. Dahi samples collected from these zones showed on an average of 4 log_{10} cfu per gram of each of lactococci, streptococci, leuconostoc and lactobacilli. The lactic isolates obtained were phenotypically and genotypically identified as Lactococcus lactis ssp. lactis (1), L. lactis ssp. cremoris (1), L.lactis ssp. lactis bv. diacetylatis (3); Pediococcus pentosaceus (2); Streptococcus thermophilus(2); Enterococcus faecium (6), E.gallinarum (1); Leuconostoc mesenteroides (4), L.lactis (1); Lactobacillus delbruckei ssp. bulgaricus (1); L.fermentum (5), L.plantarum (10), L.viridescence (1), L.hilgardii (1), Lagilis (1), L.rhamnosus (1) and Lequi (1).

Key words: Agricultural zones, Dahi, Lactic acid bacteria

MATERIALS AND METHODS

Dahi samples (100 g) of 5 numbers were collected aseptically from ten agricultural zones of Karnataka.

*Part of M.Tech thesis submitted to KVAFSU, Bidar by the first author
between August and October totally accounting for 50 samples. The codes used, name of the zone and the districts covered (2012-13) under each zone are maintained as such as depicted for agricultural research. The samples were serially diluted, required dilutions of 1 ml were plated using M17 agar for lactococci with incubation at 30°C for 24-48 hours; MRS agar for lactobacilli at 37°C for 24-48 hours and leuconostoc at 30°C for 24-48 hours. Streptococci was selected by subjecting I dilution to heating at 63°C for 30 min. using M17 agar with incubation condition of 37°C for 24-48 hours. All the poured plates were incubated in anaerobic jar. After enumeration, colonies were selected based on the morphology and transferred as well as maintained in respective broth media. The isolates were further phenotyped through battery of biochemical tests(Harrigan, 1998). In order to prove their identity, the isolates were subjected for genotypic characterization by DNA extraction and PCR by using universal primer meant for lactic acid bacteria (Pospiech and Neumann, 1995).

## RESULTS AND DISCUSSION

Lactic acid bacteria are the starters required in dahi preparation. Dahi samples from the ten agricultural zones were collected in order to know the distribution of the different types of lactic acid bacteria in dahi and further were characterized genotypically.

### Enumeration of lactic acid bacteria from dahi samples collected from ten zones of Karnataka:

Among dahi samples collected, lactococci predominated among lactic acid bacteria with the viable count from 4.34– 5.22 log_{10}cfu/g in KA-2, KA-3, KA-9 & KA10 zones while KA4 & KA-7 zones showed predominance of streptococci, where as KA-6 zone, leuconostoc was the major lactic acid bacteria with viable count of 4.54. Dahi samples collected from KA-1, KA-5 & KA8 zones, had predomination of lactobacilli. Significant difference (5%) occurred among the lactic acid bacterial counts as well as among agricultural zones (Table 1). Percent occurrence of all the lactic acid bacteria are nearly equal (25%). A similar study by Mohanan et.al.,(1983) showed predominance of lactobacilli of 70 to 300x10^6/ml on acetate agar followed by streptococci of Nil to 150x10^6/ml and total lactic count of 110 to 380x10^6/ml on Eliker agar in 15 domestic dahi samples of Bangalore. Masud et. al.(1991) also showed predomination of Lactobacillus bulgaricus, Streptococcus

### Table 1: Average count of lactic acid bacteria from dahi samples collected from ten zones of Karnataka

<table>
<thead>
<tr>
<th>Code of the zone</th>
<th>Name of the Zone</th>
<th>Lactococci</th>
<th>Streptococci</th>
<th>Leuconostoc</th>
<th>Lactobacilli</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA-1</td>
<td>North-east Transition Zone</td>
<td>3.84</td>
<td>3.45</td>
<td>3.43</td>
<td>4.25</td>
</tr>
<tr>
<td>KA-2</td>
<td>North-east Dry Zone</td>
<td>5.08</td>
<td>3.20</td>
<td>3.29</td>
<td>4.36</td>
</tr>
<tr>
<td>KA-3</td>
<td>Northern Dry Zone</td>
<td>5.22</td>
<td>3.17</td>
<td>3.57</td>
<td>4.61</td>
</tr>
<tr>
<td>KA-4</td>
<td>Central Dry Zone</td>
<td>3.81</td>
<td>3.73</td>
<td>4.33</td>
<td>4.39</td>
</tr>
<tr>
<td>KA-5</td>
<td>Eastern Dry Zone</td>
<td>3.57</td>
<td>2.85</td>
<td>3.17</td>
<td>5.22</td>
</tr>
<tr>
<td>KA-6</td>
<td>Southern Dry Zone</td>
<td>3.71</td>
<td>3.22</td>
<td>4.54</td>
<td>4.20</td>
</tr>
<tr>
<td>KA-7</td>
<td>Southern Transition Zone</td>
<td>3.89</td>
<td>4.95</td>
<td>4.02</td>
<td>4.24</td>
</tr>
<tr>
<td>KAA-8</td>
<td>Northern Transition Zone</td>
<td>3.64</td>
<td>4.31</td>
<td>3.34</td>
<td>4.66</td>
</tr>
<tr>
<td>KA-9</td>
<td>Hill Zone</td>
<td>4.34</td>
<td>4.13</td>
<td>4.31</td>
<td>3.98</td>
</tr>
<tr>
<td>KA-10</td>
<td>Coastal Zone</td>
<td>4.50</td>
<td>3.82</td>
<td>3.89</td>
<td>4.42</td>
</tr>
<tr>
<td>Average (per cent)</td>
<td></td>
<td>4.16 (25)</td>
<td>3.68 (23)</td>
<td>3.79 (24)</td>
<td>4.43 (28)</td>
</tr>
</tbody>
</table>
thermophilus, Streptococcus lactis, in dahi (50nos) samples collected from local market of Rawalpindi during summer 1990. On the contrary, Pradeep (2007) found predomination of lactococci (7.82 log<sub>10</sub>cfu/g) followed by lactobacilli (5.45 log<sub>10</sub>cfu/g) and leuconostoc (3.20 log<sub>10</sub>cfu/g) by selective plating technique using Neutral Red Chalk Lactose Agar, Rogosa Agar and Sucrose Agar respectively among microflora of four domestic curd samples collected from Bangalore.

Isolation & phenotypic identity of lactic acid bacterial isolates from dahi samples: A total of 105 lactic acid bacterial isolates were obtained from all the zones when subjected for phenotypic identification revealed 37 as lactobacilli, 26 as lactococci, 23 as leuconostoc and 19 as streptococci. On par with the present study Pradeep (2007) isolated a total of 10 numbers of lactic acid bacteria from domestic curd samples (4 nos.) that included lactococci (3nos.), lactobacilli (2 nos.) and leuconostoc (5nos.) while Deepa (2011) isolated 33 lactic acid bacteria from domestic dahi samples collected in and around Bangalore (5 nos.) that were phenotypically characterized as lactococci (9), leuconostoc(10) and lactobacilli (14).

Screening of Lactic acid bacterial isolates obtained from dahi Samples in Skim Milk: In order to screen the LAB isolates (105 numbers) obtained from dahi samples, 7 of lactococci, 2 of streptococci, 7 of enterococci and 21 of lactobacilli isolates, set the milk at 18 hours with TA of 0.64-0.66 % LA and DMC ranged 7.15 – 8.17 log<sub>10</sub>/ml. except 5 of leuconostoc (took 24hours) while other isolates did not set the milk even after 72 hours with DMC of 5.20 – 5.39 log<sub>10</sub>/ml. A similar study by Deepa (2011) who screened 10 LAB obtained from dahi samples for their activity in sterile skim milk and found that all the lactic isolates curdled the milk at 24 hours of incubation S.thermophilus (6); Leuconostoc spp (2); L. fermentum (2).

Genotypic identification of Lactic acid bacterial isolates: All the purified LAB isolates (42 numbers) after phenotypic identity when subjected to genotypic identification revealed the identity of lactococcal isolates(5) as Lactococcus lactis ssp.lactis LC14, L. lactis ssp.cremoris LC18 and Lactococcus lactis ssp. diacetylactis LC1, LC8 and LC26; streptococcal isolates (2) ST2 and ST3 as Streptococcus thermophilus, enterococcal isolates (7) ST5, ST6, ST8, ST12, ST16 and ST19 as

<table>
<thead>
<tr>
<th>S.No</th>
<th>Genus</th>
<th>Isolate code</th>
<th>Isolate identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lactococi</td>
<td>LC14, LC18, LC1, LC8 and LC26 (3)</td>
<td>Lactococcus lactis, Lactococcus lactis ssp. cremoris, Lactococcus lactis ssp. diacetylactis</td>
</tr>
<tr>
<td>2</td>
<td>Streptococci</td>
<td>ST2 and ST3, ST5, ST6, ST8, ST12, ST16 and ST19 (6)</td>
<td>Streptococcus thermophilus, Enterococcus faecium, Enterococcus gallinarum</td>
</tr>
<tr>
<td>3</td>
<td>Leuconostoc</td>
<td>Leu22 (1), Leu2, Leu8, Leu14 and Leu17 (4)</td>
<td>Leuconostoc mesenteroides ssp. lactis, Leuconostoc mesenteroides</td>
</tr>
<tr>
<td>4</td>
<td>Lactobacilli</td>
<td>Lb2, Lb4, Lb5, Lb7, Lb18 and Lb29(5), Lb31, Lb6, Lb8, Lb11, Lb12, Lb19, Lb20, Lb22, Lb23, Lb26, Lb28(10), Lb32, Lb34, Lb35</td>
<td>Lactobacillus rhamnosus, Lactobacillus fermentum, Lactobacillus hilgardii, Lactobacillus plantarum, Lactobacillus delbueckii ssp. bulgaricus, Lactobacillus equi, Lactobacillus agilis, Lactobacillus viridescens</td>
</tr>
</tbody>
</table>
Enterococcus faecium and ST10 as Enterococcus gallinarum, Leuconostoc isolates (5) as Leuconostoc mesenrioides ssp. lactis Leu22 (1); Leuconostoc mesenrioides Leu2, Leu8, Leu14 and Leu17 (4) and lactobacilli isolates (21) as Lactobacillus rhamnus Leb2, Lactobacillus fermentum. (5) Lb4, Lb5, Lb17, Lb18 and Lb29, Lactobacillus hilgardii Lb31, Lactobacillus plantarum (10) Lb6, Lb8, Lb11, Lb12, Lb19, Lb20, Lb22, Lb23, Lb26, Lb28, Lactobacillus delbueckii ssp bulgaricus Lb32, Lactobacillus equi Lb21, Lactobacillus agilis Lb34 and Lactobacillus viridesens Lb35 and the same identification was confirmed through genotyping (Table 2). A related study by Archana (2011) who phenotypically identified lactococci (51) and leuconostoc (55) isolated from dahi samples of Karnal and when subjected them to genotypic identification, only 34 out of 51 lactococci were confirmed as Lactococcus spp. while 50 of 55 leuconostoc isolates were confirmed as Leuconostoc spp.

CONCLUSION

Dahi samples collected from ten agricultural zones showed nearly equal distribution of lactococci, streptococci, leuconostoc and lactobacilli irrespective of the agricultural zonal conditions. The active cultures (42) that set the milk early revealed the identity as lactococci (7); streptococci (9); leuconostoc(5) and lactobacilli (21).

REFERENCES


Enhancement of Fermentation of Idli and Dosa Batter by Using Solid State Fermentation Cultures

Department of Dairy Microbiology, Dairy Science College, Hebbal
Karnataka Veterinary, Animal & Fisheries Sciences University, Bangalore-560 024

ABSTRACT

Idli and dosa are the favourite breakfasts of South Indians, as they are filling, nutritious and safe due to natural fermentation of batters. The present study was conducted to enhance the fermentation of batter at the earliest by incorporation of isolated and characterized Leuconostoc species from the various ingredients of idli and dosa batters, freshly prepared batters and fermented batters. Among the characterized isolates such as L.mesenteroides ssp. mesenteroides DLLeu3; L.mesenteroides ssp. paramesenteroides BGLeu1 and L.cremoris BGLeu4 when grown on sterile solid substrate ie., blackgram dhal and growth stimulants such as skim milk powder and tomato juice at 1%, when individually and in combination showed that a good biomass of 9.20 log10 per gram was obtained in case of DLLeu3 and BGLeu4 combination than individual or other combinations at 27°C for 24 hours of incubation.

These isolates were grown on sterile black gram dhal, fermented, dried, powdered and incorporated into idli and dosa batter at the rate of 1.5% (0.75 % each of DLLeu3 & BGLeu4) with fermentation at ambient temperature (27°C) for 6 hours gave good organoleptic score of both idli and dosa (9.5) by the panel of judges compared to control.

The solid state culture of combination of L.mesenteroides ssp. mesenteroides DLLeu3 and L.cremoris BGLeu4 when stored at ambient temperature (27°C) and refrigeration temperature (7°C) revealed that the refrigeration stored culture on blackgram dhal gave good acceptability of idli and dosa with sensory score of 9 for both.

Key words: Batter, Incubation, Incorporation, Solid state culture,

Breakfast is an important meal in a human diet after 8-10 hours of starvation & should provide 600 calories of energy. Fermented foods and beverages represent a significant proportion of all diets worldwide, typically about one-third of food intake, providing a major contribution nutritionally and to flavour and interest in food consumption1. Fermented products are commonly ingested in India, especially in the southern states. Nowadays, batter is sold in public for the sake of convenience, as it is a common breakfast preparation. In south India, the most favourite breakfasts are idli and dosa made of cereals and pulses that give energy as well as protein required for growth. Idli and dosa require a longer natural fermentation of 12-16 hours.

Leuconostoc mesenteroides, Streptococcus faecalis, Lactobacillus fermentum, Bacillus amyloliquefaciens and Saccharomyces cerevisiae are responsible for souring and leavening of batter by producing enzymes for saccharification of starch, acid and flavouring compounds2. Both bacteria and yeasts were contributed by the ingredients Oryza sativa and Phaseolus mungo. The prevalence of bacteria and yeasts was affected by seasonal variations but bacteria always dominated the overall microbial load3.

A fermentation of cereal–legume combinations of idli and dosa batter significantly reduced both phytate and tannin4. People look for safety aspect in idli and dosa as the batters are fermented & further steam cooked or shallow fried making them safe for consumption. The preparation and use of solid state lactic cultures on edible substrate are increasing now a days as it is an advantage in incorporation to solid foods. The dried fermented black gram dhal containing 7.0 log10 cfu/g on incorporation into commercially available infant formulae retained appreciable number of viable cell (10^6 log10 cfu/g) even after a storage period of 6 months at ambient temperature5. The research studies pertaining to preparation of solid state leuconostoc cultures, incorporation into fresh batter to enhance fermentation at early period are very scanty. Hence an attempt has been made regarding the same in the present study.

MATERIALS AND METHODS

Growth study of leuconostoc isolates: Growth study of characterized isolates obtained from
ingredients of idli and dosa batter, freshly prepared batters and fermented batters such as *L. mesenteroides* ssp. *mesenteroides* DLLeu3; *L. mesenteroides* ssp. *paramesenteroides* BGLeu1 and *L. cremoris* BGLeu4 was conducted on edible solid substrate with growth stimulants. Solid substrate used was blackgram dhal with growth stimulants skim milk powder (1%) and tomato juice (1%) contained manganese sulphate, a must for lactic cultures with 80% moisture, soaked for 10min and sterilized at 121°C for 30 min. The cultures were inoculated into sterile solid state medium, mixed thoroughly and incubated at 27°C for 48 hrs. and at every 6 hrs, the samples were drawn for direct microscopic count. This helped in fixing the time of incubation to obtain a good biomass of leuconostoc isolates.

**Preparation of Solid State Fermented (SSF) Culture:** *L. mesenteroides* ssp. *mesenteroides* DLLeu3; *L. mesenteroides* ssp. *paramesenteroides* BGLeu1 and *L. cremoris* BGLeu4 were grown on solid substrate ie., blackgram dhal, skim milk powder and tomato juice and allowed to ferment, dried and powdered for incorporation into idli and dosa batter. The flow chart for the preparation of SSF culture is given below:

**Flow Chart 1: Preparation of SSF Culture:**
Black gram dhal 100grams (1% Skim Milk Powder + 1% Tomato Juice + 80% moisture) Incorporation → Soaked for 15min → Sterilized at 121°C/30min → Inoculated with 2% of milk culture & incubated at room temperature (27°C)/24 h → Dried at 20°C in a BOD(biological oxygen demand) incubator for 12hrs → Powdered & stored in self sealing covers

**Preparation of idli and dosa batters:** Idli and dosa batters were prepared by soaking for 2 hours blackgram dhal and rice of ratio 1:3 and 1:4 respectively for 2 hours in tap water. Then the soaked grains were ground and one portion was kept as control, while other portions of batter were inoculated with individual and in combination leuconostoc isolates and at the rate of 1, 1.5 and 2% and the time given for the fermentation was 4 & 6 hours at 27°C.

**Flow Chart 2: Preparation of idli:**
Blackgram dhal + Rice at 1:3 → Soaked for 2h. & Ground → Inoculated with SSF Culture powder of 0.75% DLLeu3+ 0.75% BGLeu1 → Incubation for 6h. at 27°C → Steam cooked

**Flow Chart 3: Preparation of dosa batter:**
Blackgram dhal + Rice+ Rice flakes at 1:5:0.4+ Rice at 1:3 → Soaked for 2h. & Ground → Inoculated with SSF Culture powder of 0.75% DLLeu3+ 0.75% BGLeu1 → Incubation for 6h. at 27°C → Shallow fat frying

**Shelf life study of the SSF cultures at room temperature & refrigeration temperature:** The powdered SSF cultures of leuconostoc were sealed and stored at ambient temperature (27°C) and refrigeration temperature (7°C) for 4 months and at every 1 month viable count of the leuconostoc was carried out using sterile yeast glucose agar by serial dilution technique and pour plate method.

**RESULTS AND DISCUSSION**

**Growth Study of leuconostoc cultures on solid substrate:** *L. mesenteroides* ssp. *mesenteroides* DLLeu3; *L. mesenteroides* ssp. *paramesenteroides* BGLeu1 & *L. cremoris* BGLeu4 individually and combinations of isolates like DLLeu3 + BGLeu1; DLLeu3 + BGLeu4; BGLeu1+ BGLeu4 and DLLeu3+BGLeu1+ BGLeu4 showed a good biomass ie., DMCC of 8.90; 8.85; 8.77; 8.95; 9.20; 8.80 and 8.86 log10 cfu per gram of fermented black gram dhal respectively at 27°C when incubated for 24 hours of compared to other incubation hours during incubation of 0-48 hours(Table 1). The association of *L. mesenteroides* ssp. *mesenteroides* DLLeu3 with *L. cremoris* BGLeu4 was the best that showed highest biomass with 9.20 log10 cfu per gram compared to individual or in combination of isolates. The statistical analysis indicated significant difference between the growth period and DMC.
Table 1: Growth study of Leuconostoc mesenteroides ssp. mesenteroides DLeu3; L.mesenteroides ssp. paramesenteroides BGLeu1 & L. cremoris BGLeu4 on black gram dhal at 27°C for 48 hours

<table>
<thead>
<tr>
<th>Hours</th>
<th>DMC log_{10}/g</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DLeu3</td>
<td>BGLeu1</td>
</tr>
<tr>
<td>0</td>
<td>5.95</td>
<td>5.75</td>
</tr>
<tr>
<td>6</td>
<td>6.69</td>
<td>6.47</td>
</tr>
<tr>
<td>12</td>
<td>6.95</td>
<td>6.95</td>
</tr>
<tr>
<td>18</td>
<td>7.30</td>
<td>7.00</td>
</tr>
<tr>
<td>24</td>
<td>8.90</td>
<td>8.85</td>
</tr>
<tr>
<td>30</td>
<td>7.77</td>
<td>7.77</td>
</tr>
<tr>
<td>36</td>
<td>7.47</td>
<td>7.30</td>
</tr>
<tr>
<td>42</td>
<td>6.77</td>
<td>6.84</td>
</tr>
<tr>
<td>48</td>
<td>5.00</td>
<td>5.30</td>
</tr>
</tbody>
</table>

Note: Black gram dhal with 1% each of skim milk powder and tomato juice with 80% moisture was soaked for 10 min and sterilized at 121°C for 30 min.

Incorporation of SSF cultures into idli and dosa batter: The combination of L.mesenteroides ssp. mesenteroides DLeu3 with L. cremoris BGLeu4 showed higher counts on fermented blackgram dhal with additives when dried, powdered and incorporated to batters of idli (1:3 of blackgram dhal & rice) and dosa batter (1:5 of blackgram dhal & rice) at 1, 1.5 and 2 per cent showed a good organoleptic score of 9.5 for both prepared idli and dosa at incorporation at 1.5% to batters and fermented for just 6 hours while control batters without incorporation of SSF cultures showed lesser score of 7.5 and 6 for idli and dosa when judged by the panel of judges, as natural fermentation of batters took 10-12 hours in order to obtain good quality idli and dosa. Lower and higher than 1.5% incorporation of leuconostoc SSF cultures DLeu3 and BGLeu4 each at 0.75% to make 1.5%, did not give a good organoleptic score when tasted by judges. Even the individual

Table 2: Performance of Solid State Fermented (SSF) cultures in idli and dosa batters

<table>
<thead>
<tr>
<th>SSF culture</th>
<th>Percent of SSF culture incorporated to batters</th>
<th>Score</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>1.5%</td>
<td>2.0%</td>
</tr>
<tr>
<td></td>
<td>Idli</td>
<td>Dosa</td>
<td>Idli</td>
</tr>
<tr>
<td>L.mesenteroides ssp.mesenteroides DLeu3</td>
<td>6.30</td>
<td>6.25</td>
<td>8.50</td>
</tr>
<tr>
<td>L.mesenteroides ssp Paramesenteroides BGLeu1</td>
<td>6.15</td>
<td>6.75</td>
<td>9.50</td>
</tr>
<tr>
<td>L.cremoris BGLeu4</td>
<td>6.20</td>
<td>7.75</td>
<td>9.00</td>
</tr>
<tr>
<td>DLeu3 + BGLeu1</td>
<td>6.20</td>
<td>6.25</td>
<td>9.00</td>
</tr>
<tr>
<td>DLeu3 + BGLeu4</td>
<td><strong>6.50</strong></td>
<td><strong>7.87</strong></td>
<td><strong>9.50</strong></td>
</tr>
<tr>
<td>BGLeu1 + BGLeu4</td>
<td>6.25</td>
<td>6.20</td>
<td>8.00</td>
</tr>
<tr>
<td>DLeu3 + BGLeu1 + BGLeu4</td>
<td>6.20</td>
<td>6.25</td>
<td>7.25</td>
</tr>
<tr>
<td>Control</td>
<td>6.20</td>
<td>6.50</td>
<td><strong>7.50</strong></td>
</tr>
</tbody>
</table>

CD 0.55
Table 3: Effect of storage on the viability of SSF culture \( L.\) \textit{mesenteroides} ssp. \textit{mesenteroides} DLeu3 + \( L.\) \textit{mesenteroides} ssp. \textit{paramesenteroides} BGLeu1 at room temperature \((27^\circ\text{C})\) and refrigeration temperature \((7^\circ\text{C})\)

<table>
<thead>
<tr>
<th>Storage period</th>
<th>0 day</th>
<th>1(^{\text{st}}) month</th>
<th>2(^{\text{nd}}) month</th>
<th>3(^{\text{rd}}) month</th>
<th>4(^{\text{th}}) month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viable count (log(_{10}) cfu/g)</td>
<td>27(^{\circ})C</td>
<td>7(^{\circ})C</td>
<td>27(^{\circ})C</td>
<td>7(^{\circ})C</td>
<td>27(^{\circ})C</td>
</tr>
<tr>
<td>SSF culture</td>
<td>50</td>
<td>8.50</td>
<td>7.50</td>
<td>8.10</td>
<td>7.07</td>
</tr>
<tr>
<td>CD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

leuconostoc SSF cultures or any other combination did not work well in improving the taste of prepared idli and dosa (Table 2). The statistical analysis indicated significant difference between the inoculum level and SSF culture. A fermented batter of black gram + rice – 1:3 (idli) and 1:5 (dosa) was tried for bioavailability of zinc and iron that increased by fermentation of batters.

**Shelf life study of SSF cultures:** Further after seeing improvement in taste of idli and dosa by incorporation of SSF cultures of \( L.\) \textit{mesenteroides} ssp. \textit{mesenteroides} DLeu3 with \( L.\) \textit{cremoris} BGLeu4, the SSF cultures were stored at ambient temperature and refrigerator to monitor the viability of the cultures. It was interesting to note that till 3 months the viability of SSF culture was 6(6.20 log\(_{10}\) cfu/g) and 7 log (7.68 log\(_{10}\) cfu/g) at ambient and refrigeration temperatures respectively showing one and 2 log number reduction in the viability compared to 0 day of 8 log numbers. Further storage month, showed only 5 log counts (in SSF culture both temperatures of storage. After each storage month, the solid state culture containing both DLeu3 and Bleu4 when incorporated at 1.5% (each of DLeu3 and Bleu4 at 0.75% ) to idly and dosa batter and left for 6 hours at ambient temperature, gave good scores of prepared idly and dosa up to three months of storage of cultures in refrigerator, later the quality of idly and dosa were not much accepted by panel of judges. The statistical analysis indicated significant difference between the storage period and temperature.

**ACKNOWLEDGEMENT**

We are grateful to the Karnataka, Veterinary, Animal and Fisheries Sciences University for funding the project.

**REFERENCES**


Acute Toxicity Study of Emetic Nut (Catunaregum spinosa) in Juveniles of Zebra Fish (Brachydanio rerio)

Shridhar, N. B1, Jagadeesh S Sanganal2 and Santhosh Kumar, C. N.3
Department of Veterinary Pharmacology and Toxicology, Veterinary College, KVAFSU, Hebbal, Bangalore-560 024, Karnataka, India

ABSTRACT

Fruits of common emetic nut plant (Catunaregum spinosa) were evaluated for its toxicity in fish. The LC50 for fresh crushed fruits of C. spinosa in juvenile Zebra-fish was derived as per the bioassay method for evaluating acute toxicity of industrial effluents and waste water. Serial concentrations of crushed fruit extract were employed for the study i.e., 60, 75, 80, 85, 90, 100, 110 and 125 mg/L. Each concentration was tested in a container with 10 fishes in 4 liters of water to identify the LC50. Fresh leaves and crushed fruit extracts were tested for the presence of nitrate and cyanide. Phytochemical analysis for both fresh leaves and fresh fruit extract was also done for the screening of steroids, alkaloids, flavonoids, terpenes, saponins, tannins and glycosides by using Thin Layer Chromatography. LC50 was found to be 87.5 mg/L in juvenile Zebra-fish, fresh leaves and crushed fruits of C. spinosa were negative for the presence of nitrate and cyanide on diphenylamine test and picrate paper test respectively. The phytochemical analysis revealed the presence of alkaloids, steroids and terpenes. Thus fresh crushed fruits of emetic nut plant (C. spinosa) were shown to be toxic to Zebra fish and further work is necessary to evaluate the effect on predatory fish in field condition.

Key words: Catunaregum spinosa; Zebra Fish; LC50; nitrate; cyanide; Phytochemical analysis.

Various techniques have been used by man to catch fish for food purpose. Catunaregum spinosa is one such plant commonly known as Emetic nut used for catching fish in Western Ghats and Maharashtra (Kulkarni et al. 1990). Piscidal property of the fresh aerial part of the Mimosa pudica plant has been evaluated (Shridhar, 2004). However, there is no experimental evidence on toxicity of fruits of C. spinosa in fish. Presently, costlier and non biodegradable chemicals have been utilized for capturing prey fish worldwide. Exploring the use of biodegradable plant scientifically could possibly minimize environmental hazards. Keeping in this view, the present study was conducted to evaluate the effect of fresh crushed fruits of C. spinosa on fish.

MATERIALS AND METHODS

Fresh fruits of Emetic nut (C. spinosa) were collected from Talaguppa of Sagar, Shimoga, Karnataka. One hundred gram of fresh crushed fruits were weighed and finely ground and the volume made upto 2 litre in distilled water (50 g/L) and was used as stock solution.

Juvenile Zebra-fish (Brachydanio rerio) of 3±0.30 g were used in this study. Before and during the experiment the fish were kept in standard laboratory conditions at Central Laboratory, Karnataka State Pollution Control Board, Bangalore. The LC50 for fish was derived for crushed fresh crushed fruits of C. spinosa as per the bioassay method for evaluating acute toxicity of industrial effluents and waste water, IS 6582 (Part II), (2001).

Experimental Design: Range finding toxicity test was conducted, the concentrations of 25, 50, 75, 100, 125, 150, 200 and 250 mg/L of fresh crushed fruits were made from the stock solution. Water used in the present study was shown to be negative for Coliform bacteria (Slooff, 1982). Each concentration was tested on one fish in 100 ml water along with one fish as control in water without any concentration of crushed fruits. The fish were observed for mortality in 96 hours.

Based on the range finding study, concentrations ranging from 60 to 125 mg/L were considered to find the LC50 of the fresh crushed fruits of C. spinosa. Eight serial concentrations...
were employed for the study \textit{i.e.}, 60, 75, 80, 85, 90, 100, 110 and 125 mg/L. Each concentration was tested in a container with 10 fishes in 4 liters of water and observed for 96 hours for morbidity and mortality and the data generated was subjected to Probit analysis (Finney, 1971), nonlinear regression graph was plotted and LC\textsubscript{50} was determined using Graph Pad Prism software.

Fresh leaves and crushed fruit extract were tested for the presence of nitrate (Housholder \textit{et al.}, 1966) and cyanide (Bark, 1963). Aqueous, ether, chloroform and methanol extracts were prepared according to standard extraction procedures (Beckett and Stenlake, 1986). Phytochemical analysis for both fresh leaves and fresh fruit extract was done by using Thin Layer Chromatography for the screening of steroids, alkaloids, flavonoids, terpenes, saponins, tannins and glycosides (Harborne, 1991).

\textbf{RESULTS AND DISCUSSION}

The per cent mortality was 100\% at a concentration of 110 mg/L, 80\% at 100 mg/L, 70\% at 90 mg/L, 45 \% at 85 mg/L, 30\% at 80 mg/L, 20\% at 75 mg/L and no death at 60 mg/L. The calculated LC\textsubscript{50} was 87.5 mg/L (Table, Graph I). The fish in the water which was served as control does not showed any mortality.

\textbf{Table: The percent death of fish and corresponding probit values at different concentrations of fresh crushed fruits of \textit{C. spinosa}.}

<table>
<thead>
<tr>
<th>Concentration (mg/L)</th>
<th>Death (%)</th>
<th>Probit values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>75</td>
<td>20</td>
<td>4.18</td>
</tr>
<tr>
<td>80</td>
<td>30</td>
<td>4.48</td>
</tr>
<tr>
<td>85</td>
<td>45</td>
<td>4.87</td>
</tr>
<tr>
<td>90</td>
<td>70</td>
<td>5.67</td>
</tr>
<tr>
<td>100</td>
<td>80</td>
<td>5.84</td>
</tr>
<tr>
<td>110</td>
<td>100</td>
<td>8.09</td>
</tr>
<tr>
<td>125</td>
<td>100</td>
<td>8.09</td>
</tr>
</tbody>
</table>

\textbf{Graph I: The concentration of fresh crushed fruits of \textit{C. spinosa} against probit values derived from percent death of fish.}

Fresh crushed fruits of \textit{C. spinosa} were negative for the presence of nitrate and cyanide on diphenylamine test and picrate paper test respectively. The petroleum ether extract of \textit{C. spinosa} showed the presence of steroids and terpenes. The methanol extract showed the presence of alkaloids. Aqueous extract was negative for steroids, alkaloids, flavonoids, saponins, tannins and glycosides. This is the first phytochemical analysis of the fresh fruits and no such published information.

Fresh crushed fruits of \textit{C. spinosa} were toxic to fish and had an LC\textsubscript{50} of 87.5 mg/L. Similar studies were conducted in fish with other plants, Cantrell \textit{et al.} (2003) reported bioactivity against brine shrimp (\textit{Artemia salina}) from crude extract of \textit{Diospyros dichrophylla}. Blaza \textit{et al.} (1987) identified proanthocyanidin polymers as the piscicidal constituents of \textit{Diospyros dipenhorstic} leaves.

The toxic nature of the fresh fruits of the plant \textit{C. spinosa} to the Zebra fish may be attributed to the phytochemical ingredients which need to be explored.

\textbf{CONCLUSION}

Fresh crushed fruits of \textit{Catunaregum spinosa} were toxic to juvenile Zebra fish with LC\textsubscript{50} of 87.5 mg/L. Further similar type of research work should be carried out on predatory fish in field condition for its effect so that, this property can be utilized for...
controlling predatory fish in shrimp and pisciculture as an alternative to costlier and non-biodegradable chemicals.

ACKNOWLEDGEMENT
The authors are thankful to Dr. B. R. Balagangadhar, Chief Scientific Officer, Pollution Control Board, Bangalore for providing facility to conduct the experiment.

REFERENCES


Electrocution in a Cat and its Management – A Case Report

Suchitra B.R., Anil Kumar M.C., and Nagaraj N.
Department of Veterinary Gynaecology and Obstetrics, Veterinary college, Hassan 573 202.

ABSTRACT

A 5 month old male cat was presented to Veterinary Hospital, Doddaballapur taluk, Bangalore rural district with a history of recumbency and burns on the left foreleg. Upon clinical examination, burnt areas on the left foreleg were visible and peculiar smell like burnt human hairs was detectable. The presented case was diagnosed as electric shock in cat and treatment was immediately started with supplementation of oxygen, administration of dexamethazone and Dextrose Normal Saline i/v. Since major portion of the left forelimb was burnt and chances of necrosis was possible amputation of the left forelimb was done and post operatively cat was administered with antibiotics for 7 days along with regular wound dressing. The cat became active and started taking food after 7 days.

Key words: Cat, Electrocution, Amputation

Electric wires are very tempting to cats, especially those cats that play with long, thin toys. The electric wire could look like another toy and curious cats take a bite. Sadly, cats and kittens die every year from electric shock. Electrical injuries can result in burns to the surrounding area (e.g., the mouth, hair), or alterations to the electrical conduction in the heart, muscles, and other tissues. The possible complications that follow an electric cord bite injury are fluid accumulation in the lungs i.e., pulmonary edema (Kolata and Burrows 1981), and high blood pressure in the arteries near the lungs (pulmonary hypertension). Additionally, there have been reports of animals developing cataracts – an eye abnormality - after such injuries. Cats and kittens have been known to survive electrocution, but they need veterinary treatment immediately (Delbert, 1998). A case of electrocution in a cat and its management is reported.

Case Report: A five month old male cat was presented to Veterinary Hospital, Doddaballapur taluk, Bangalore rural district with a history of recumbency and burns on the left foreleg. Upon anamnesis the owner of the cat said that, the cat while playing came in contact with the live electric wire and due to electric shock there were burns on the foreleg. Upon clinical examination, burnt areas on the left foreleg were visible and peculiar smell like burnt human hairs was detectable. The heart beat and respiration were irregular. The case was diagnosed as electric shock and treatment was immediately started with supplementation of oxygen by placing oxygen tube into the nasal opening of the cat. To overcome shock the cat was also administered with dexamethazone (®Dexona) @ 8 mg/kg b.wt intravenously followed by slow administration of Dextrose Normal Saline around 50 ml slow i/v. After 45 minutes the cat passed urine and became slightly active. Since major portion of the left forelimb was burnt and chances of necrosis was possible it was decided to amputate the leg and the owner was advised to bring the cat next day without food for amputation of fore limb. The leg of the cat was amputated as per the standard procedure and skin sutures were done. Post operatively the cat was administered with ceftriaxone (® Intacef) @ 22 mg/kg b.wt slow i/v for 7 days along with regular wound dressing. The cat became active and started taking food and water normally.

Cats and kittens die every year from electric shock. Cats suffering from an electrical shock usually lie on their sides (Fig 1) and may go into seizures. If the cat is still under shock, the body may be stiff or convulsing. Depending on how severe the shock is, the cat may have trouble walking or slink along the floor as if terrified. The cat may hide and not want to come out to be
inspected. But if the shock is mild, then the cat may recover enough to regain consciousness before a person finds it. Cats and kittens have been known to survive electrocution, but they need veterinary treatment immediately (Delbert, 1998). In the present case also, treatment was done immediately by supplementation of oxygen followed by intravenous administration of corticosteroids and fluids to overcome shock and amputation of leg to overcome necrosis of leg followed by post operative treatment which saved the life of the cat (Fig 2).

Fig-1: Cat affected with electrocution

Fig-2: Same cat after amputation of leg

The most important step in preventing electrical injury is to keep the pet away from electrical cords. Additionally, inspect all cords in the house for safety. Using baby-proof measures in the home is one way of protecting the pets against injury. Most hardware and full service department stores carry household child-protection.

REFERENCES

Seminoma with Intraepithelial Germ Cell Neoplasia in a Pomeranian Dog - A Case Report

Sudha G, Krishnaswamy A, Narasimhamurthy, Honnappa T G and Navya .M
Department of Gynecology and Obstetrics, Veterinary College, KVAFSU, Hebbal, Bangalore-560 027

ABSTRACT

Testicular neoplasia is the second most common tumor types. Neoplasia of the testis comprises of 91 percent of male genital system. A Pomeranian dog aged 13 years was presented with generalized alopecia and scrotal enlargement. On palpation the enlarged scrotum, the animal did not evince any pain and on ultrasonography revealed anechoic regions indicative of fluid accumulation. Based on palpation and ultrasound evaluation of the scrotum it was tentatively diagnosed as testicular tumor. Bilateral orchiectomy was performed. Histopathology revealed Seminoma with Predominant Intraepithelial Germplasm Neoplasia.

Key words: Alopecia, Neoplasia, Seminoma, Ultrasonography

Testicular neoplasia is the second most common tumor types after skin tumor. Neoplasia of the testis occurs in approximately one percent of dogs and comprises of 91 percent of male genital system. The mean age of diagnosis of the neoplastic conditions of male genital system is 9-11 years. Testicular tumors may be unilateral or bilateral and of multiple cell types. Presence of two or more tumor types concurrently in one or both testes has been reported to occur. This report deals with presence of seminoma with intraepithelial germ cell tumor in a pomeranian dog.

History: A pomeranian dog aged 13 years was presented to the Clinic of Department of Gynecology and Obstetrics, Veterinary College, Bangalore, with a complaint of generalized alopecia and scrotal enlargement. The swelling had started as a small enlargement a year ago and had increased to a size of a tennis ball when presented for examination. Although the enlargement interfered with the mobility of the dog. It had normal appetite and had no other symptoms of systemic illness.

Clinical Signs and Diagnosis: On physical examination, the animal showed thinning of the abdominal skin and engorged abdominal blood vessels. It also exhibited bilateral symmetric alopecia of the flank, perineum and inguinal region. The scrotal enlargement was of the size of tennis ball. One scrotum had increased in size while the other was of the normal size. The enlarged scrotum had the feel of the fluid filled structure. The animal did not evince any pain on palpation. Ultrasonic evaluation of the testis was performed using B-mode, 7.5 MHz transducer. The evaluation revealed a disrupted architecture of the testis in enlarged scrotum. It had hypoechoic regions surrounded by hyperechoic capsule and large anechoic space (fluid filled) (fig 1 to 3). Based on palpation and ultrasound evaluation of the scrotum it was tentatively diagnosed as testicular tumor.

Treatment: The dog was operated under general anesthesia and bilateral orchiectomy was performed. It had uneventful recovery after surgery. On pathological examination the affected testis had a lobulated mass with cross section of the testis showing khaki colored lobules in the parenchyma of the testis. The tissue from both the affected and unaffected testis was sent for histopathological evaluation. Histopathology revealed Seminoma with Predominant Intraepithelial Germplasm Neoplasia. Tumor cells were large round to polygonal with moderate amount of Eosinophilic cytoplasm and pleomorphic vesicular nuclei with clumped chromatin.
DISCUSSION

The three most common type of testicular tumors reported in dogs are sertoli cell tumor, seminoma and interstitial cell tumor (Johnson et al, 2001). Seminomas are tumors of germ cells within the testis. They are very common in dogs. They comprise 31 percent of the testicular tumors. Older dogs are more likely to be affected and the mean age for diagnosis of this condition is 10 years. Seminomas metastatize locally in about 15 percent of cases and distantly in 6-10 percent of cases (McDonald et al., 1988). Seminomas cause testicular enlargement as the main clinical sign. The absence of pain on palpation gave an indication that it could be neoplasia instead of orchitis. The treatment of choice for testicular tumors is orchiectomy because of the relatively high incidence of bilateral neoplasia, and atrophy of unaffected testis, bilateral orchiectomy is recommended. On macroscopic evaluation testicular seminomas have well circumscribed intratesticular mass. The mass is white and homogenous, rarely having obvious necrosis or hemorrhage when it is small (Maiolino et al 2004; Looijenga LH et al; 1994).

REFERENCES


Esophageal Obstruction in Bovines – A Report of Two Cases

Manjunatha, D. R., Mahesh, V. and Ranganath, L.
Department of Veterinary Surgery and Radiology, Veterinary College, KVAFSU, Bangalore-24

ABSTRACT

Esophageal obstruction can occur in cows due to greedy nature of swallowing to meet the nutritional requirements. Esophageal obstruction can be diagnosed based on history, clinical examination, by passing stomach tube and by contrast radiography. In the present paper two cases of esophageal obstruction were diagnosed based on history and clinical examination. Esophagotomy was performed with the animal in standing position. A tennis ball and unripe mango respectively were removed from each case. The surgical wound was sutured in a routine manner. Both the animals made uneventful recovery by the 10th postoperative day.

Key words: Esophageal obstruction, Esophagotomy, Probang

Obstruction of esophagus occurs infrequently in ruminants. Intraluminal blockade of the esophagus, popularly called choke and obstruction, occurs mostly in the cervical region. Esophageal obstruction in cows is caused because of their greedy nature of swallowing (Jit Singh et al., 1993). Esophageal obstruction due to stone (Dilip Kumar et al., 1995), potato (Mahesh et al., 2011) and by a piece of gunny bag and its diagnosis by contrast radiography (Nigam et al., 1978) has been reported.

In the present paper two cases of cervical esophageal obstruction and its surgical management by esophagotomy were reported.

MATERIALS AND METHODS

Five and seven year old Jersey and Holstein Friesian crossbred cows weighing about 300 and 400 kg respectively were presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Hebbal, Bangalore, with a history of anorexia, dysphagia, ptyalism, respiratory distress and ruminal tympany. On examination the mass was felt at mid cervical region on palpation in both the cases. The probang could not be passed beyond the palpable mass. Both cases were tentatively diagnosed as esophageal obstruction and it was decided to perform esophagotomy.

TREATMENT AND DISCUSSION

In both the cases, a longitudinal incision was made on left lateral cervical region dorsal to jugular vein on the mass with the animal in standing position. The operation were performed under local infiltration analgesia with 2% lignocaine Hcl. Esophagus was approached and incised to remove foreign body which was a tennis ball in case-1 (Fig-1) and mango in case-2 (Fig-2). The surgical site was thoroughly flushed with Normal Saline and esophagus was closed by simple interrupted pattern using Polyglactin-910 No.1-0. The jugular furrow and subcutaneous tissue was sutured using simple continuous suture pattern using chromic catgut No.2 and skin by horizontal mattress sutures using Monofilament Polyamide No.1 in both the cases.

![Fig 1: Showing tennis ball as foreign body in the esophagus](image-url)
Postoperatively Streptopenicillin 5g daily for 7 days i/m and Meloxicam 50mg for three days i/m were administered. Intravenous fluid therapy was done by administering 4 Liters 5% Dextrose and 4 Liters Ringer’s lactate for 3 days. Wheat bran and Rice bran with water was fed for another four days and later on green succulent roughages were fed. The sutures were removed on 10th post-operative day and both the animals made uneventful recovery.

**Fig. 2: Showing un ripened mango as foreign body in the esophagus**

Mahesh *et al.*, (2010), reported a case of cervical esophageal obstruction was relieved by left lateral esophagotomy. In present paper also the same procedure was followed to relieve esophageal choke. In cases of esophageal obstruction, repeated and forceful use of probang should be avoided to prevent rupture of esophagus (Singh *et al.*, 1990) but in present cases it was impossible to push the obstructed mass into rumen by probang. Dilip kumar (1995) and Mahesh *et al.*, (2010), reported esophageal obstruction in bullock caused by stone and in Holstein Friesian crossbred cow caused by potato respectively. The present paper reports successful surgical management of esophageal obstructions by a tennis ball and mango in Jersey and Holstein Friesian cross breed cows respectively.

**CONCLUSION**

Successful surgical management of cervical esophageal obstruction by tennis ball and mango in a two cross breed cows were presented and discussed.

**REFERENCES**


Successful Surgical Correction of Symphyseal Fracture of Mandible in a Dog – A Case Report

Suresh, L.*, Sudheesh Nair, S. and Nagaraj, N.
Department of Veterinary Surgery and Radiology, Veterinary College, KVAFSU, Hassan – 573 201

ABSTRACT
A three year old dog was referred to the Department of veterinary surgery and radiology, veterinary college, Hassan with a history of asymmetrical drooping of jaw with drooling of blood tinged saliva and the animal was not able to close the mouth completely. Physical examination revealed complete fracture of mandible at symphysis with ventral deviated left fractured fragment. The case was successfully treated by manual reduction and surgical correction by stainless steel wiring.

Key words: Dog, Mandible, Symphyseal Fracture

CASE HISTORY
A three year old non-descript dog was referred to the Department of veterinary surgery and radiology, veterinary college, Hassan with a history of automobile accident. On close observation there was asymmetrical drooping of jaw with drooling of blood tinged saliva and the animal was not able to close the mouth completely. Physical examination revealed a complete fracture of mandible at symphysis with a ventral deviated fractured fragment (fig.1). Radiographic, Clinical and haematological examination were performed and it was decided for a surgical correction.

After manual reduction of the symphyseal fracture, a 20 gauge stainless steel wire was inserted in to mucosa and skin ventrally along the lateral mandibular surface just caudal left canine tooth which was taken out ventrally to the mandible. The other end of the wire is introduced similarly through mucosa along the lateral border of horizontal ramus of other mandible and both the ends of the wire were twisted each other. The wire was left in situ for 6 weeks. Post operatively meloxicam 0.2 mg/kg, was administered as an analgesic for 5 days, cefriaxone 15mg/kg body weight was administered orally twice daily for 5 days along with B-complex injections. The animal was kept on fluid therapy for one week and soft food was given during the second post operative week. The animal had an uneventful recovery which resulted in complete fusion of the symphyseal edges and normal mastication (fig.2).

TREATMENT AND DISCUSSION
The dog was premedicated with atropine sulphate @ 0.04 mg /kg bwim, ceftriaxone @ 10mg/kgim, and xylazine 1mg/kg im and approximately 20 min later general anaesthesia was induced and maintained with intravenous Thiopentone sodium.
Withrow et al., (1981) reported Simple undisplaced mandibular fractures can be stabilized by adhesive tape muzzle and wiring encircling around mandible and maxilla (Chaffee, 1978 and Leighton, Wolf., 1979). Cerclage wiring is most simple, effective method for treating physeal fractures of mandible (Chaffee, 1978 ) in dogs, except for some of the complications like trapping of food particles in between wire and gums leading gingivitis (Harasen, 2008), which can be controlled by rinsing of mouth with antiseptics like chlorhexidine (Niemiec, 2003) and proper post operative antibiotic therapy. In the present case cerclage wiring has proved effective and economical technique for fracture of mandibular symphysis in a dog with an average healing time of 6 weeks.

REFERENCES
Management of Post Cervical Uterine Torsion in a Crossbred Cow - A Case Report

Renukarady G.J1, Suchitra B.R2, Sahadev A3 and Dhabale R.B4
Veterinary College, Hassan

ABSTRACT

A pluriparous full term pregnant crossbred cow at its second parity was presented with history of restlessness, anorexia and excessive straining with no progress of parturition for last 24-36 hours. Through per-vaginal and per-rectal examination the case was diagnosed as maternal dystocia due to post-cervical uterine torsion. A dead male fetus was successfully relieved by mutation after detorsion of the uterus by rolling with per vaginum manipulation.

Key words: Dystocia, Rolling per-vaginum, Uterine torsion.

Uterine torsion is one of the frequent maternal causes of dystocia in riverine buffaloes and cows that commonly occurs near parturition and less common during gestation. It is a condition where the entire length of the gravid uterine horn rotates on its longitudinal axis to the left (anti-clockwise) or right side (clockwise) and is more commonly observed in pluriparous than in primiparous animals (Roberts, 1982). Success of management of torsion depends on the degree and duration of the torsion. 90-180° torsion occurs during last few months of gestation and become evident at the time of parturition, while 180 - 360° uterine torsion is a severe condition often associated with obstruction of the blood supply to the uterus and finally death of the fetus (Noakes et al., 2009). Therefore timely management of the problem is important to save the life of the fetus as well as the dam.

Case history, Observation and Clinical Management: A pluriparous full term pregnant crossbred cow at its second parity was presented to Teaching Veterinary Clinical Complex, Veterinary College, Hassan, with history of restlessness, anorexia and excessive straining since last 24-36 hrs with no progress in parturition. On clinico-gynaecological examination the vulval labia were found slightly tense and the cow was continuously straining. Per vaginal examination revealed vaginal folds that were orientated to the right (clockwise) and ventral. On per rectal examination no fetal parts were palpable. Through per-rectal and per-vaginal examination the case was diagnosed to be right sided (360°) post-cervical uterine torsion.

Since fetal parts were not palpable either due to its location or severity of torsion (360°) manual correction was not possible and hence alternative correction method, rolling with per vaginum manipulation was considered (Nick and Paddy 2013). The animal was cast on the right lateral recumbency with forelimbs and hind limbs tied separately. The torsion was clockwise and hence the cow was rolled in the same direction with the operators hand in the vagina. After three successive rollings, per vaginal examination revealed relaxed cervix where two fingers could be passed and complete detorsion was confirmed but due to partially dilated cervix calf was not delivered.

Even after allowing the cow for one hour, there was no appearance of either fetal bag or fetal fluids from the vulva. Through per-vaginal examination after one hour, fetus was palpable through the moderately dilated cervix probably in the process of dilatation and was found to be in normal anterior longitudinal presentation with extended fore limbs and head. Cow was continuously straining and bleeding from vulva was noticed. At this juncture to hasten the dilatation process the cow was intra-venously supplemented with 450 ml of calcium boro gluconate and 2500 ml of 5% DNS and 500 ml of RL. During the fluid and calcium supplementation progressive dilatation of cervix was observed through which the first water
bag was visible through the vulva, and subsequently rupture of allantois and amnion was noticed without any further progress. Hence forelimbs of fetus were tied over the fetlock joint with the help of snare and a dead male fetus was delivered by forced traction by two attendants.

Placental separation was evident even before parturition and hence bleeding from the vulva could be attributed. Following delivery 8 Steclin boli (Tetracyclin 500mg) intrauterine, 4 in each uterine horn were introduced and Methergin® (Methyl Ergometrine) 2 mg (TD) I/M was injected. A course of parenteral antibiotic Dicrysticin® (streptomycin and penicillin) 2.5 gm/day I/M was administered for 5 days. The animal was also administered Melonex® (Meloxicam) 15 ml and Cadistin® (Pheneramine maleate) 15 ml I/M for 3 days. The animal was found completely normal after 3 days of treatment.

**DISCUSSION**

Uterine torsion is one of the frequent maternal causes of dystocia in riverine buffaloes and cows that commonly occurs near parturition and less commonly during gestation (Purohit et al., 2011). Predisposing factors in cattle include instability of the bovine uterus, an oversize foetus, energetic movements of the fetus during first stage of labour, hilly pastures, possibly low calcium levels, manner in which the cow rises, sudden push from another cow, lack of tone to the uterus, lack of fetal fluids, sudden fall and confinement of the animal (Binsila et al., 2011; Nick et al., 2013; Noakes et al., 2009). Torsions to the left occur more frequently than to the right (Erteld et al., 2012), however Purohit et al., (2011) has reported right side uterine torsion and Binsila et al., (2011) has reported the postcervical uterine torsion in a Murrah buffalo. Rolling the dam along with per vaginal manipulation of fetus (Nick et al., 2013) has proved very useful for the correction of uterine torsion in the cow. Nick Lyons and Paddy Gordon (2013) have also reported that after detorsion of the uterus, 43% of the cows required further obstetrical intervention with the most common reason being incomplete cervical dilatation as found in the present case. The prognosis of uterine torsion is good when correction is done early. In delayed cases beyond 36 hours the chances of fetal survival are negligible (Purohit et al., 2011). Death of the fetus in the present case can be attributed to the delay in consultation to clinics, already separated placentomes, resulting in lack of blood supply to the uterus due to torsion and subsequent hypoxia (Noakes et al., 2009).

**REFERENCES**


Caudal Esophageal Choke in Two Dogs

Manjunatha, D. R., Mahesh, V. and Ranganath, L.

Department of Veterinary Surgery and Radiology, Veterinary College, KVAFSU, Bangalore-24.

ABSTRACT

Esophageal obstruction is common in dogs and obstruction may be present either at cervical or at thoracic portion of esophagus. In the present paper two dogs with history of retching, dysphagia and ptyalism were subjected to survey radiograph of thorax revealing radio-opaque foreign body in the caudal esophagus close to the cardia. Upon laparogastrotomy under general anesthesia corn cob and bone piece were removed through the gastrotomy. This lead to uneventful recovery in both the dogs.

Key words: Choke Laparo-gastrotom and Cardia.

Esophageal obstructions are common in dogs and most commonly reported foreign bodies include bones, wood pieces, small clothes, glass beads, plastic papers and hard objects (Easom, 1983). They may be present either at cervical or at thoracic portion of esophagus because of uniformly expandable feature of canine esophagus (Sureshkumar et al., 2003). The normal sites of esophageal obstruction in dogs are thoracic inlet, base of the heart and distal hiatus (Jones et al., 1989). In the present paper, successful surgical management of caudal esophageal choke via gastrotomy in two dogs was reported.

MATERIALS AND METHODS

Two male spitz dogs of 3 and 6 years age respectively were presented to the Department of Veterinary Surgery and Radiology, Veterinary College Hospital, Bangalore, with a history of retching, dysphagia and ptyalism. Physical examination revealed no abnormalities in the oral cavity and cervical region. Survey radiograph of thorax revealed radio opaque foreign body in the caudal esophagus close to cardia (Fig-1). It was diagnosed as choke and decided to go for laparogastrotomy for removal of the foreign body through stomach wound.

TREATMENT AND DISCUSSION

The dogs were prepared aseptically for laparogastrotomy. They were premedicated with Atropine sulphate at the rate of 0.04 mg/kg body weight subcutaneously and Triflupromazine hydrochloride 1 mg/kg body weight intravenously and induced and maintained with 2.5% Thiopentone sodium. Animals were positioned on dorsal recumbancy and laparogastrotomy was performed. Through the gastrotomy, a finger was passed to know the seat of obstruction in the esophagus, later alli’s tissue forceps was passed into the esophagus via cardia and the obstructing foreign body was dislodged into stomach and removed through the gastrotomy wound (Fig-2). The foreign bodies were found to be corn cob in case-1 and a bone piece in case-2 (Fig-3). Gastrotomy wound was closed by double row of inversion suture using No 2-0 chromic catgut and the abdominal wound was closed by routine manner. Post-operatively, fluid therapy was done for three days, Ceftrixone sodium 20mg/kg was administered intra muscullarly twice daily for five days. Animals were allowed to take liquid diet after three days of surgery and solid food after one week. Both the animals recovered uneventfully.
Small foreign bodies normally reach stomach without causing obstruction (Clifford, 1985) but in the present cases, the foreign body caused obstruction at caudal esophagus. Thillagar et al., (2006) reported a long thick steel wire causing cervical esophageal obstruction in dog and Uma Rani et al., (2003) reported bone piece in the post pharyngeal region of esophagus causing obstruction, but in the present case bone and corn cob were the foreign bodies causing caudal esophageal obstruction in dogs. Sureshkumar et al., (2003) stated that esophageal foreign bodies could be easily removed through endoscopy. In the present case caudal esophageal foreign bodies were removed through lapro-gastrotomy and dogs recovered uneventfully.

**CONCLUSION**

Successful surgical management of caudal esophageal choke in two dogs is reported.

**REFERENCES**


A Rare Occurrence of Schistosomus Reflexus in a Goat Kid

Mallikarjuna G¹, Nagaraju N, Ravikumar P, Suresh L and Vasanth M. S
Veterinary College, Hassan

ABSTRACT

Schistosomus reflexus is a fatal congenital anomaly and a common cause of dystocia found primarily in ruminants in which the fetus shows folding of the backbone, scoliosis, exposure of the abdominal and thoracic viscera and ankylosis of the limbs, hypoplasia of diaphragm and liver along with the abnormalities of the digestive and genitourinary systems. The article reviews the occurrence of Schistosomus reflexus in a ruminants and discus its rare occurrence in goats. An adult female goat in its third pregnancy was treated for dystocia and the delivered fetus showed the characteristic features of Schistosomus reflexus characterized by lateral curvature of the abdominal column, herniation of the abdominal viscera due to non union of the ventral abdominal wall, rudimentary formation of the diaphragm and the presence of a sternal cleft.

Key words: Goat, Ruminants, Schistosomus reflexus

Schistosomus reflexus is a common cause of dystocia and it has been reported in bovine (Cavalieri and Farin, 1999, Knight, 2008, and Nereu and Jane, 2010), sheep (Dennis and Meyer, 1965., camel (Elias, 1991), goat (Tripathi et al., 2008), dog and cat (Kawata and Tiba, 1961 and Mateo and Camon, 2008). The Schistosomus reflexus is a fatal congenital and a rare aberration found primarily in ruminants gestating a fetus with folding of the backbone, exposure of the abdominal and thoracic viscera, ankylosis of the limbs, diaphragm and liver hypoplasia, scoliosis and abnormalities of the digestive and genitourinary systems. It is an anomaly of the trunk with malformation of the thoracic and abdominal cavities and resulting in exposure of viscera (Roberts, 1971). The present report outlines the details of a rare occurrence of Schistosomus reflexus in a nondescript goat encountered in a Veterinary Dispensary of Karnataka state.

Case History: An adult female goat on its third pregnancy was presented to the Veterinary Dispensary, Tavarekere, Kunigal taluk, Karnataka with a history of full term of pregnancy, severe straining for eight hours and off feed. The doe was exhausted and recumbent. Clinical examination revealed mild degree of dehydration, oral and conjunctval mucosa appeared normal, there was bradycardia with rapid and shallow respiration. On abdominal palpation no foetal movements were observed. Inspite of overnight straining the animal could not pass the foetus and even the foetal limbs were not visible outside the birth canal. Pervaginal examination revealed dried birth canal, dead foetus, presentation and posture of the foetus being normal and lateral kinking of spinal column along with herniation of abdominal viscera was evident.

Clinical Manipulation And Relieving Of Dystocia: The general condition of the goat was fair and the ligaments were totally relaxed. The perineal region of the goat was thoroughly cleaned with potassium permanganate solution (1:1000). The birth passage was completely relaxed and after sufficient lubrication animal was examined pervaginally and a dead kid with its head and limbs in the pelvic cavity was noticed. Attempt was made for relieving the kid with controlled traction on the forelimbs with snares and head. Traction was continued after thorough lubrication with liquid paraffin and a dead monster kid was delivered pervaginum. The anomalous male kid (Fig.1 & 2) was a Schistosomus reflexus. The fetus had a single head, two forelimbs, two hind limbs and single tail. Lateral curvature of the vertebral column was found at the level of thoracic and lumbar vertebra with the digestive organs which were exposed due to non-union of ventral wall of abdomen.

¹Veterinary Officer, Veterinary Dispensary, Tavarekere, Kunigal Tq, Tumkur Dist, Karnataka - 572 123
DISCUSSION

Schistosomus reflexus which is characterized by marked skeletal defects and extensive deformities involving an organ or a part of the body could be one of the major important causes resulting in difficulty in parturition. It is reported to be most common in cattle and occasional in sheep, goats and pigs (Jana and Mousumi, 2001). The present communication reports such a rare occurrence of a case of Schistosomus reflexus in a nondescript goat. The congenital anomaly of the kid was accompanied with Schistosomus reflexus characterized by anatomical disorder in the spine, partly open abdominal cavity with rudimentary formation of the diaphragm, and exposure of abdominal viscera as a result of a sternal cleft, characterized with a fissure extending from the xiphoid process of the sternum to the anterior aspect of the pubic bone. These findings were in conformation with the findings of the previous workers.

REFERENCES


Dystocia due to Schistosoma Reflexus in a HF Crossbred Cow

Manjunatha, D. R., Naveen, B. R., Nagappa K Banuvalli, Sangeetha Jadhav, Lohith, J. and Santhosh, K. M.
Veterinary Dispensary Anathi, Department of Animal Husbandry and Veterinary Services, Hassan.

ABSTRACT:
Schistosoma reflexus is a foetal monster with a marked skeletal defects and it is an anomaly of the trunk with malformation of thoracic and abdominal cavities resulting in exposure of viscera. It is one of the cause of dystocia in cattle. Present paper involves a case report of a cow with history of labor pain, ruptured water bag with relaxed pelvic ligaments and difficulty in parturition. On per vaginal examination foetus was found dead, foetal viscera protruding out from the vulva and head and limbs of foetus were abnormally oriented in the cervix. Upon partial fetotomy under caudal epidural anaesthesia dystocia due to schistosoma reflexus was relieved.

Key words: Schistosoma reflexus, Fetotomy Dystocia and Cow.

Schistosoma reflexus is a major congenital anomaly which occurs during embryonic development (Cavalieri and Farin, 1999). It is characterized with congenital anomaly of fusion and involves the severe ventral curvature of the spine and inversion of the back of the neck towards the sacrum (antero-posterior abnormal curvature) (Knight, 1996). Schistosoma reflexus is an acute angulation of the vertebral column such that the tail lies close to the head, the chest and abdominal cavities are incomplete ventrally so that the viscera are exposed, such cases may cause dystocia. These abnormality is common in ruminants and swine (Arthur et al., 1996). Although the etiology of certain congenital anomalies remain unclear, but these anomalies may be due to genetic factor, mutations, chromosomal anomalies, infectious agents and environmental factors or combination of above listed factors (Adhikari and Joshi, 2011). The present paper reports a case of dystocia due to Schistosoma reflexus in a Holstein Friesian crossbred cow.

MATERIALS AND METHODS
A multiparous full term pregnant Holstein Friesian crossbred cow was presented to Veterinary Dispensary, Anathi, Channarayapatna Taluk, Hassan District with a history of overnight labor pain with ruptured water bag, the vulva was edematous and pelvic ligaments were relaxed. The foetal viscera were protruding out from the vulva. On per vaginal examination the head and limbs were abnormally oriented towards the pelvic inlet with the absence of foetal reflex. No tear in the uterus and the continuity of the viscera was traced to the fetus. Based on the case history and observation the present case was tentatively diagnosed as dystocia due to Schistosoma reflexus and it was decided for partial foetotomy to relieve the dystocia.

TREATMENT AND DISCUSSION
Dystocia was relieved under caudal epidural anaesthesia with 2% lignocaine hydrochloride. The birth canal was lubricated with castor oil. The head and one of the forelimb were cut by using giggly wire saw, then by force full traction the fetus was removed (Fig). Post-obstetrically the mother was administered with Intalyte 2L, Calcium borogluconate 450ml and Oxytocin 40 IU intravenously. Meloxicam was administered 0.3mg/kg body weight intramuscularly for two days and Ceftriaxone 3g was administered intravenously for three days. The foetal membranes expelled after 5 hours of delivery and the mother made uneventful recovery.
Schistosoma reflexus is a fetal monster with marked skeletal defects (Hafez, 1997). It is an anomaly of the trunk with malformation of thoracic and abdominal cavities resulting in exposure of viscera (Roberts, 1971), which was observed in the present case. Arthur et al., (1996) stated that, in schistosoma reflexus fetal rigid vertebral angulation may be tightly fit in pelvic brim results in dystocia and cannot be relieved by forced traction. Foetotomy or caesarian section are the suitable techniques. In the present case both head and limbs were abnormally placed in the birth canal along with the viscera was the reason for dystocia. Partial foetotomy was performed to relieve the dystocia. Jayakumar et al., (2012) reported dystocia due to fetal hydrocephalus in a crossbred cow and Adhikari and Joshi (2011) reported dystocia due to schistosoma refluxus in a goat, where as in present case dystocia due to schistosoma reflexus was reported in Holstein Friesian crossbred cow.

**CONCLUSION**

Successful management of dystocia due to schistosoma reflexus in crossbred cow through partial foetotomy under field condition was reported and discussed.

**REFERENCES**


Incidence of Gestational, Parturient and Post Parturient Accidents in Osmanabadi Goats

Bijurkar, R. G.*, Krishnaswamy, A.¹, Honnappa, T. G.², Murthy, C.³, Jayashankar, M. R.⁴, and Jayakumar⁵
Dept. of Veterinary Gynaecology and Obstetrics, Veterinary College, Karnataka Veterinary Animal &Fisheries Sciences University, Bidar-585401

ABSTRACT

The incidence of gestational, parturient and postparturient accidents was studied in Osmanabadi goats at organized farm. The incidence of abortion, vaginal prolapse, dystocia and retained fetal membranes were recorded as 5.24, 1.87, 4.87 and 4.12 per cent.

Key words: Abortion, Dystocia, Osmanabadi goats, Retained fetal membranes, Vaginal prolapse,

India possess 20 indigenous goat breeds of which Osmanabadi is important indigenous meat purpose breed of North Karnataka, Maharashtra and some parts of Andhra Pradesh. The estimated population of Osmanabadi goat is about 1.32 millions (Livestock census, 2007) and is popular for its delicate meat, with the birth weight 2.39 ± 0.02 kg, kidding interval 249.12 ± 9.50 days, with percentage of singles, twins and triplet kids being 53.73, 32.83 and 6.71 respectively (Markendeya and Devanagare, 1997). This potential can be improved by precise knowledge of reproductive disorders leading to low productivity.

In the present study, the incidence of gestational, parturition and postparturient accidents were studied from the villages at the border area of the Karnataka, Maharashtra and Andhra Pradesh and records maintained at Tuljapur and Ambajogai goat farms belonging to Punyashlok Ahilyadevi Sheep and Goat Board, Maharashtra.

The records of Osmanabadi does were screened for any gestational, parturient or postparturient disorders that were exhibited during the last two years. Information on all abnormal events such as abortion, dystocia, vaginal prolapse and retention of fetal membrane were obtained from the records and the data was used to establish the incidence of various gestational, parturient or post parturient disorders in Osmanabadi goats.

Abortion: The incidence of abortion in Osmanabadi does was recorded as 5.24% (Table). Mellado (2006) reported the overall incidence of abortion in dairy goats to range from 3 to 8%. However, goats have been reported to have a higher incidence of abortion than compared to other farm animals. It was reported as 23% by Durani and Kamal (2009). The cause for the higher incidence of abortion in the goats has not been elucidated. However, in present study heat stress in summer season and fighting among the pregnant and non-pregnant animals were the main cause of abortion.

Vaginal prolapsed: In the present study vaginal prolapse was recorded only during 5 out of 267 (1.87%) pregnancies and all were of vaginal prolapse of first degree. Osmanabadi does appeared to have a very low incidence of vaginal prolapse during pregnancy. There are no other reports on the incidence of vaginal prolapse in Osmanabadi does. However, the overall incidence of vaginal prolapse in goats was reported as 3.6% from the records of civil veterinary hospital, Lahore as reported by Durrani and Kamal, (2009). Baxendell, (1980) claimed that it is seen most often in Saanen does and the predisposing factors are thought to be similar to those in cattle and sheep which include heredity, increased intra abdominal pressure,
excessive estrogen in the forage and relaxed perineal tissues due to confinement.

**Dystocia:** In the present study dystocia was recorded in 4.87% of the deliveries (Table). The incidence of dystocia observed in Osmanabadi goats is lower than those reported in Saanen goats 17% (Konyali et al., 2007) 45.8% (Durrani and Kamal, 2009). The most common dystocias in goats is reported to occur when more than one fetus tries to exit the vaginal canal at the same time (Bliss, 1988). However, in the present study there was a very low incidence of multiple births, which might be a major factor for the low incidence of dystocia in Osmanabadi does.

### Table. Incidence of gestational, parturient and post-parturient accidents in Osmanabadi goats

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of accident</th>
<th>Observations</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Abortion</td>
<td>14 (267)</td>
<td>5.24</td>
</tr>
<tr>
<td>2.</td>
<td>Prolapse of vagina</td>
<td>5 (267)</td>
<td>1.87</td>
</tr>
<tr>
<td>3.</td>
<td>Dystocia</td>
<td>13 (267)</td>
<td>4.87</td>
</tr>
<tr>
<td>4.</td>
<td>Retention of fetal membranes</td>
<td>11 (267)</td>
<td>4.12</td>
</tr>
</tbody>
</table>

**Retained fetal membranes:** The incidence of retained fetal membranes in Osmanabadi does was recorded as 4.12%. There are very few reports on the incidence of retained fetal membranes in goats. Naik et al. (2007) reported the incidence of retained fetal membranes in Parabhan district of Maharashtra as 20.05%. The diagnosis of retained fetal membranes in goats is considered to be difficult, as does often eat part or the entire placenta and this could be a major factor in the variations in the incidence of retained fetal membranes (Konyali et al., 2007).

Incidence of gestational, parturient and postparturient accidents was studied in Osmanabadi goats. The percent abortion, vaginal prolapse, dystocia and retained fetal membranes were recorded as 5.24, 1.87, 4.87 and 4.12 respectively.

### REFERENCES


Training Need Assessment for Livestock Farming – A Farmers Perspective in Karnataka State of India

Jagadeeswary V and Satyanarayan K
Department of Veterinary & Animal Husbandry Extension Education, Veterinary College, Bangalore.

ABSTRACT

The present study was carried out to assess the training needs of livestock farmers of the adopted villages of KVAFSU. One hundred livestock farmers were interviewed using a pre-tested interview schedule. The results revealed that majority of the livestock farmers had medium to low profile in terms of personal, socio-economic and psychological characteristics. Among the listed training needs of the dairy, sheep and goat and poultry farmers of Haniyuru village, value addition of milk with a mean score of 1.80, sale of meat and meat products (1.92) and backyard poultry farming (1.54) were ranked as important training needs respectively. Among the listed training needs of the dairy, sheep and goat and poultry farmers of Solluru village, diseases and their control measures with a mean score of 1.72, silage making (1.72), value addition of meat (1.74) and backyard poultry farming (1.54) were expressed as most important training needs respectively.

Key Words: Dairy, Training need,

Livestock sector has been playing an important role in Indian economy and is an important sub-sector of Indian agriculture. In order to tap the complete potential of livestock sector the farmers felt needs should be addressed (Farinde and Ajayi 2005). It is discovered that most of the farmers depend on friends, spouse, neighbors and other native sources like local leaders and educated people for their information needs. Besides, other studies (Chalermphol and Shivakoti 2009) confirmed that information exchange within rural communities is indicated as one of the most common responses to farmers’ cognitive needs. This highlights the importance of extension and training for farmers as they play a major role in capacity building, raising their awareness and providing them with modern knowledge aiming at enhancing their performance to achieve their ultimate goal of development.

Building on the existing difficulties and constraints, the researcher conducted the present study to study the profile as well as assess the training needs of the livestock farmers.

Following exploratory research design, the present study was conducted in Karnataka state of India. Two villages namely; Haniyuru and Solluru were purposively selected for the study from Bangalore north taluk and Devanahalli taluk of Karnataka state, being the adopted villages of Veterinary College and Dairy Science College, Bangalore, KVAFSU respectively. A total of 100 farmers were selected randomly for the study, at the rate of 50 from each of the selected village. Before the final data collection, pre-testing was carried out so as to make the appropriate changes in the construction and sequence of interview schedule. Data were collected from the selected livestock farmers through face-to-face interview. Data were analyzed with appropriate statistical tools and the statistical analysis was carried out with the help of SPSS 10.0 package.

Profile of livestock farmers: Majority of the livestock farmers were middle aged (41.00%), medium experience (47.00%), were illiterates (29.00%), possessed crossbred cattle (45.00%), had membership in cooperative societies (55.00%), were in low income group (56.00%) The results were in confirmation with the findings reported by Prakash et al. (2003) and Raju (2003) who found majority in middle age group; Jagadeeswary (2003), Ravikumar (2007) and Satyanarayana (2008) who reported medium experience; Prakash et al. (2003) and Ravikumar (2007) for education status; Satyanarayan et al. (2010) for animal possession, Ravikumar (2007) and Jagadeeswary (2009) for low income of livestock farmers. It was observed that majority of the livestock farmers in the study area had low to medium profile and hence should be give due consideration while formulating suitable extension strategies for improving their socio-economic status.
Training needs of dairy farmers: The results in the Table 1 indicated the training needs of dairy farmers of Haniyuru and Solluru villages. Among the listed training needs of the dairy farmers of Haniyuru village, value addition of milk with a mean score of 1.8 was expressed by majority of the farmers as an important training need. This might be because majority of the livestock farmers in the study area might be interested in understanding the value added products of milk so as to increase their profitability from dairy farming. In case of the training needs of dairy farmers of Solluru village, diseases and their control measures and silage making with a mean score of 1.72 were expressed as important training need. High disease proneness of dairy animals in the study area might be the reason for the most important training need felt by the livestock farmers.

Table 1: Training Needs of Dairy farmers

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Training Need</th>
<th>Haniyuru (MS)</th>
<th>Solluru (MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Economical computation of Balanced ration</td>
<td>1.44</td>
<td>1.60</td>
</tr>
<tr>
<td>2</td>
<td>Silage making</td>
<td>1.62</td>
<td>1.72</td>
</tr>
<tr>
<td>3</td>
<td>Growing of Azolla</td>
<td>1.70</td>
<td>1.64</td>
</tr>
<tr>
<td>4</td>
<td>Urea enrichment of fodder</td>
<td>1.56</td>
<td>1.66</td>
</tr>
<tr>
<td>5</td>
<td>Fodder varieties and trees, their nutrient values</td>
<td>1.70</td>
<td>1.54</td>
</tr>
<tr>
<td>6</td>
<td>Feeding and management of lactating cows</td>
<td>1.54</td>
<td>1.46</td>
</tr>
<tr>
<td>7</td>
<td>Feeding and management of pregnant cows</td>
<td>1.48</td>
<td>1.62</td>
</tr>
<tr>
<td>8</td>
<td>Hygienic housing system</td>
<td>1.52</td>
<td>1.52</td>
</tr>
<tr>
<td>9</td>
<td>Care and Management of new born calves</td>
<td>1.40</td>
<td>1.56</td>
</tr>
<tr>
<td>10</td>
<td>Management of heifers</td>
<td>1.56</td>
<td>1.52</td>
</tr>
<tr>
<td>11</td>
<td>Manure management</td>
<td>1.68</td>
<td>1.34</td>
</tr>
<tr>
<td>12</td>
<td>Breeds of dairy animals and their characteristics</td>
<td>1.30</td>
<td>1.48</td>
</tr>
<tr>
<td>13</td>
<td>Selection of a good milking animal</td>
<td>1.28</td>
<td>1.62</td>
</tr>
<tr>
<td>14</td>
<td>AI and it advantages</td>
<td>1.46</td>
<td>1.36</td>
</tr>
<tr>
<td>15</td>
<td>Diseases and their control measures</td>
<td>1.66</td>
<td>1.72</td>
</tr>
<tr>
<td>16</td>
<td>Clean Milk production</td>
<td>1.54</td>
<td>1.70</td>
</tr>
<tr>
<td>17</td>
<td>Value addition of milk</td>
<td>1.80</td>
<td>1.50</td>
</tr>
<tr>
<td>18</td>
<td>Sale of milk and milk products</td>
<td>1.78</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Training needs of sheep and goat farmers: The results in the Table 2 revealed the training needs of sheep and goat farmers of Haniyuru and Solluru villages. Among the listed training needs of the sheep and goat farmers of Haniyuru village, sale of meat and meat products with a mean score of 1.92 was expressed by majority of the farmers as an important training need. In case of sheep and goat farmers of Solluru village, value addition of meat with a mean score of 1.74 was expressed by majority of the farmers as an important training need. Sheep and goat farmers in the study area might be interested in understanding the value addition and marketing of the meat and meat products and hence, the important training needs.

Table 2: Training Needs of Sheep, Goat and Poultry farmers

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Training Need</th>
<th>Haniyuru (MS)</th>
<th>Solluru (MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Economical computation of Balanced ration</td>
<td>1.76</td>
<td>1.46</td>
</tr>
<tr>
<td>2</td>
<td>Fodder varieties and trees, their nutrient values</td>
<td>1.68</td>
<td>1.54</td>
</tr>
<tr>
<td>3</td>
<td>Feeding management of sheep and goats</td>
<td>1.60</td>
<td>1.50</td>
</tr>
<tr>
<td>4</td>
<td>Hygienic housing system</td>
<td>1.66</td>
<td>1.48</td>
</tr>
<tr>
<td>5</td>
<td>Care and Management of new born kids/lambs</td>
<td>1.54</td>
<td>1.62</td>
</tr>
<tr>
<td>6</td>
<td>Manure management</td>
<td>1.72</td>
<td>1.58</td>
</tr>
<tr>
<td>7</td>
<td>Diseases and their control measures</td>
<td>1.54</td>
<td>1.62</td>
</tr>
<tr>
<td>8</td>
<td>Breeding management</td>
<td>1.78</td>
<td>1.60</td>
</tr>
<tr>
<td>9</td>
<td>Value addition of meat</td>
<td>1.84</td>
<td>1.74</td>
</tr>
<tr>
<td>10</td>
<td>Sale of meat and meat products</td>
<td>1.92</td>
<td>1.72</td>
</tr>
</tbody>
</table>

Training needs of poultry farmers: The results in the Table 2 also indicated the training needs of poultry farmers of Haniyuru and Solluru village. Among the listed training needs of the poultry farmers of Haniyuru and Solluru villages, backyard poultry farming with a mean score of 1.54 was expressed by majority of the poultry farmers as an
important training need. Small scale of farming and interest in increasing the profitability through understanding the details of backyard poultry farming might be the reasons for the most important training need felt by the poultry farmers in the study area.

Short duration trainings on improved dairy, sheep & goat and poultry management practices of 1-2 days at the village level should be organized on the areas expressed by majority of the farmers. Exposure tours should be organized for the livestock farmers to visit model dairy, sheep & goat and poultry farms of KVAFSU so as to make the farmers aware of the best practices in livestock production.

REFERENCES


