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(THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION)

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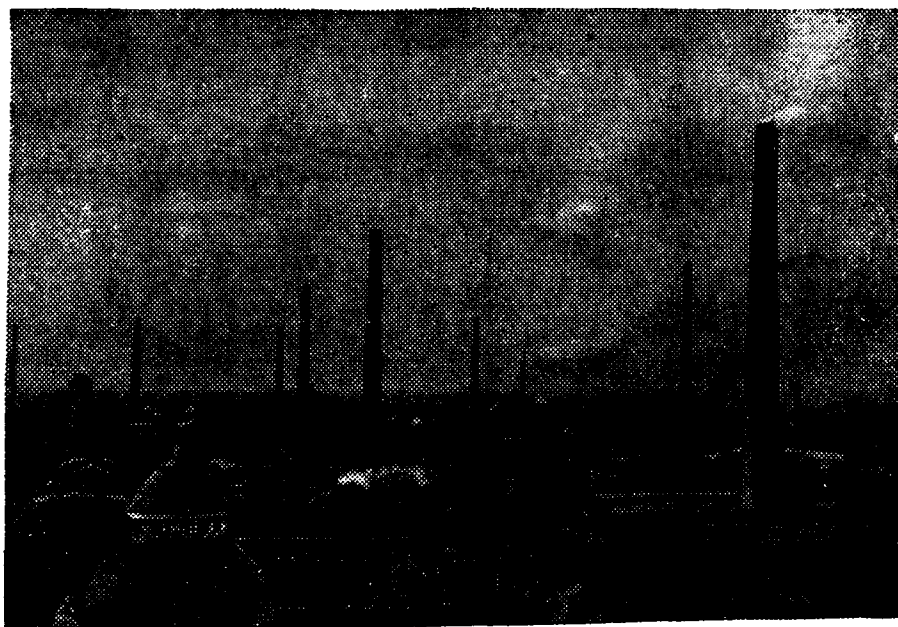
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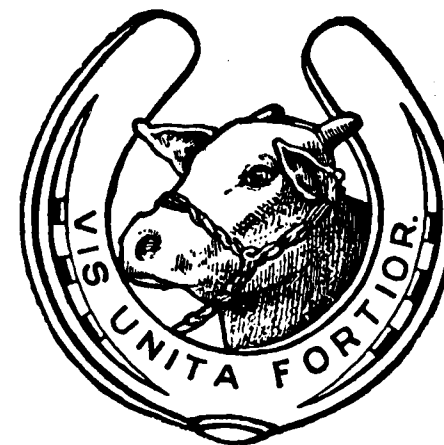
No. 1

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED ON ALTERNATE MONTHS

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(ESTD. 1924)

EDITOR

P. SRINIVASA RAO, G.M.V.C., Madras.

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General Articles 466

STUDIES ON BOVINE ENDOMETRITIS

The lesions produced in the uterus of guinea-pigs by injections of suspensions of *Corynebacterium pyogenes*, *Corynebacterium equi* and *Staphylococcus albus*.*

By

DR. I. M. AZIZUDDIN, B.A., G.M.V.C., B.V.Sc. (Madras) Ph.D. (Edin).,
Madras.

Introduction

In the course of the author's studies on the Bacteriology and Pathology of bovine endometritis, a number of well-defined groups of bacteria were isolated from cases of endometritis in cows. The experiments described in this paper were undertaken with the object of testing the pathogenicity of some of these important bacteria upon the uterus of animals under experimental conditions.

The ideal animal to use for this purpose would have been the cow itself, but economic considerations prevented such a procedure being adopted. Among the laboratory animals the choice fell on the guinea-pig for its uterus resembles that of the cow in its gross anatomy.

As the usual methods of subcutaneous, intraperitoneal or intravenous inoculation are not suitable for the purpose of this study, it was found necessary to adopt a technique by which micro-organisms could be introduced directly into the uterus with certainty. Hence it was decided

* This research was carried out at the Royal (Dick) Veterinary College, Edinburgh and the Hannah Dairy Research Institute, Ayr, during the author's period of deputation at the University of Edinburgh. The author is now the Principal, Madras Veterinary College, Madras.

to inject bacterial suspensions into ligated segments of the uterus of guinea-pigs. By this method one could follow not only the fate of the bacteria but also the reactions of the uterine tissues in a circumscribed area.

Materials

Female guinea-pigs weighing between 350 to 400 grams were used in these experiments. Since the changes which take place in the endometrium during different phases of the oestrous cycle might influence the resistance of the tissues towards micro-organisms, it was decided to use guinea-pigs at a definite period of the cycle, in order to get comparable results. The period chosen was 5 to 7 days after heat, which was determined by examination of smears prepared from vaginal fluid and stained with haematoxylin and eosin as described by Stockard and Papanicolaou (1917).

The following five strains of bacteria were used in these experiments: Two strains of coagulase negative *Staphylococcus albus* (Nos. 17/2 and S 251) isolated from catarrhal endometritis, two strains of *Corynebacterium pyogenes* (Nos. 120 and 15/10) and one strain of *Corynebacterium equi* (No. 78) isolated from suppurative endometritis.

Methods

The bacterial suspensions were prepared in the following manner. In the case of staphylococcus a 24 hour glucose-broth culture was used. *Corynebacterium pyogenes* was grown on Loeffler's serum for 48 hours, then the growth was washed in 5 c.c. of normal saline; for *Corynebacterium equi* the suspension consisted of a 48 hour glucose-broth culture. In each case the culture was tested for purity by examination of smears. The dose was 0.05 c.c. of the bacterial suspension.

Operative technique

The whole of the abdominal area of the skin was closely clipped and shaved. Under ether anaesthesia the guinea-pig was laid on its back and secured in position. The cutaneous and muscular layers of the abdominal wall were incised along the linea alba and the peritoneal cavity was entered with complete aseptic precautions. The uterus was then exposed and fixed in position with the aid of a glass rod. The tubal end of each uterine horn was ligated by means of a sterile ligature. The lumen of the right horn was entered into by means of a fine needle fitted to a syringe containing the bacterial suspension. A second ligature was inserted at the cervical end a little below the point where the needle entered. Into this tied-off segment 0.05 c.c. of the bacterial suspension was injected and the lower ligature tied firmly as the needle was being withdrawn. Extreme care was taken to avoid any undue disturbance of the uterine tissue. The left horn, which

Plate No. 1

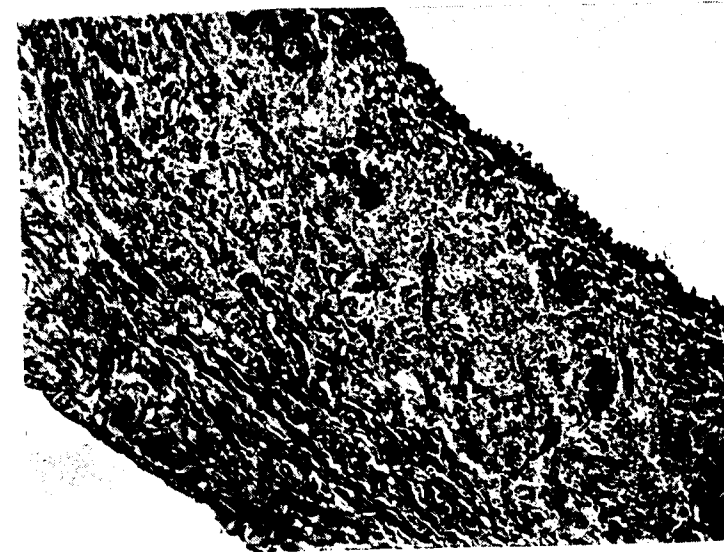


FIG. 1. *C. pyogenes* infection of guinea-pig's uterus. Section of a four-day lesion showing epithelial degeneration, leucocytic infiltration, capillary engorgement with hemorrhage and edema of the connective tissue.

Hæmatoxylin-eosin. X 200



FIG. 2. *C. pyogenes* infection of guinea-pig's uterus. Section of a seven-day lesion showing necrosis of the superficial layers of the endometrium and their replacement with purulent exudate; the underlying connective tissue is edematous and shows infiltration; the glands have largely been obliterated.

Hæmatoxylin-eosin. X 200



FIG. 3. *C. pyogenes* infection of guinea-pig's uterus. Section of a ten-day lesion showing superficial necrosis of endometrium; purulent tracts penetrate deeply into the wall reaching the muscular layer.
H&E, X 200



FIG. 4. *C. pyogenes* infection of guinea-pig's uterus. Section of a fifteen-day lesion showing extensive necrosis of endometrium which appears to be breaking away from its attachment; clumps of pus are visible to the left of the photograph.
H&E, X 200

was similarly ligated (but without injection of the bacterial suspensions), served as a control. The abdominal incision was closed by means of catgut and the animal allowed to recover.

In order to secure uniform conditions of the experiment, the general plan was to inoculate five guinea-pigs for each culture on the same day. Provided the operation was carried out with proper care the guinea-pigs had an uneventful recovery.

With a view to follow the progress of reaction the guinea-pigs were sacrificed at the rate of one each at the end of 2, 4, 7, 10 and 15 days respectively following the injection. After macroscopic observation of the uterus and obtaining materials for cultural examination, both the injected and control horns were fixed in formal saline for histological examination.

Results

Corynebacterium pyogenes (Strain No. 120)

2 days.—The injected segment of the uterus was markedly distended almost double that of the normal control horn in diameter. The uterine wall was tense and inflamed. The lumen was filled with an albuminous cloudy exudate, containing masses of polymorphonuclear leucocytes and a few plasma cells. Histological sections through the injected horn showed an acute inflammation of the mucosa, with infiltration of polymorphonuclear leucocytes.

4 days.—The lesion was a little enlarged and distended. The wall was rather thin and showed fluctuation. The serosa was tense and petechiated. The lumen was filled with thin, creamy pus. Histological sections revealed small areas of epithelial desquamation. Just underneath the epithelium there was a dense layer of polymorphonuclear infiltration. The connective tissue was oedematous with haemorrhage and capillary engorgement (Fig. 1.)

7 days.—The enlargement of the inoculated cornual segment was more general, with tense walls whose serosa showed numerous petechiae. The lumen was distended with a sticky, creamy pus, while the mucosa was brick-red studded with pin-head like necrotic spots and punctiform erosions. Histological sections revealed extensive necrosis of the superficial layers of endometrium and their replacement with purulent exudate; the underlying connective tissue was oedematous and showed cellular infiltration; the glands were mostly obliterated (Fig. 2)

10 days.—By this time the lesion was a typical pyometra, with distended walls and appearing like a sausage. The diameter of the injected horn was 13 m.m., as compared to 3 m.m. of the normal control horn. The

lumen was packed with thick creamy pus which was adherent to the mucosa in dense granular masses. The mucosa was dark brown and showed extensive areas of erosions. Histological sections showed complete absence of epithelium and in some parts superficial mucosal layers were necrosed. Masses of leucocytes were found to penetrate deeply at various levels of the connective tissue reaching the muscular layer (Fig. 3.).

15 days:—The cornual lesion was greatly distended measuring 18 m.m. in diameter as compared to the normal horn which was 3 m.m. The lesion, which was egg-shaped, had occupied most of the abdominal cavity and was pressing upon the intestines. In some there were local areas of adhesions with the intestinal loops and broad ligaments of the uterus. The wall was stiff and leathery with a sticky discoloured serosa (Fig. 10). On opening the horn the pus which was held in tension came out with force. The pus was thick, creamy yellow and emitted a foul odour. The mucosa was dark, rough and covered with sloughs and erosions. Histological sections showed extensive necrosis of the endometrium which appeared to be breaking away from its attachments. In some the mucosa was completely absent and was replaced by cell debris and leucocytes. The muscular layer was markedly thinned and showed purulent tracts and necrotic foci. The uterine glands were completely destroyed and were not recognisable (Fig. 4).

Pure cultures of *Corynebacterium pyogenes* were recovered from the lesions at every stage of the reaction. The uninoculated control horn was normal in appearance and its structure corresponded to the oestral period at which examination took place.

Corynebacterium pyogenes (Strain No. 15/10)

It gave rise to similar typical lesions at the various stages of infection as described for strain No. 120.

Since it was surmised whether strains of *Corynebacterium pyogenes* isolated from sources other than the uterus would give rise to similar lesions, one strain of *Corynebacterium pyogenes* isolated from acute suppurative mastitis was inoculated into the uterus of the guinea-pigs in the usual manner. One of the guinea-pigs was destroyed on the tenth day and the other on the fifteenth day after inoculation. The lesions were similar to the ones produced by *Corynebacterium pyogenes* strain No. 120 at the corresponding periods of infection. The 15 day lesion had formed extensive adhesions with the broad ligaments, intestines and abdominal wall.

Corynebacterium equi

2 days.—The inoculated horn showed only a slight inflammatory reaction. The lumen of the horn contained small amount of albuminous fluid and the mucosa appeared normal. The epithelium was intact with a slight leucocytic infiltration in the superficial connective tissue.



FIG. 5. *C. equi* infection of guinea-pig's uterus. Section of fifteen-day lesion showing degeneration of the epithelium and glands with sub-epithelial infiltration; note the marked thinning of the uterine wall resulting from the distension of the horn with exudate.
Haematoxylin-eosin. X 200

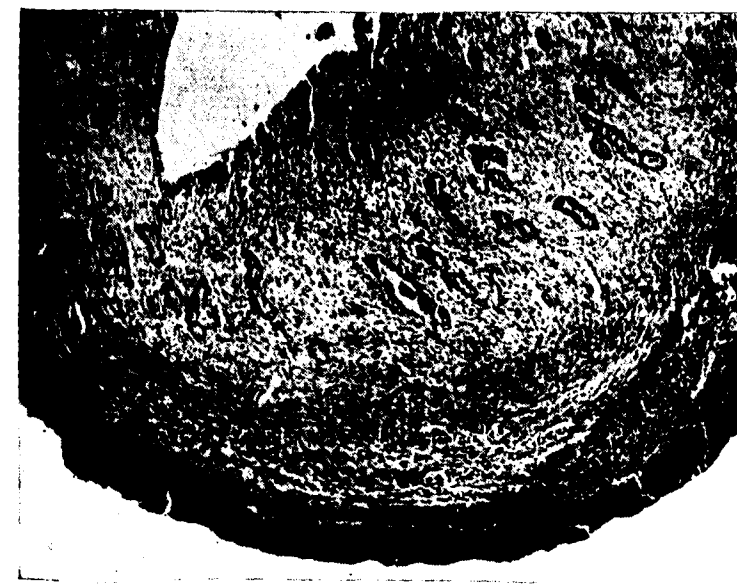


FIG. 6. Section of the uninoculated control horn of the 15-day lesion (above) of *C. equi*.
Haematoxylin-eosin. X 100



FIG. 7. Staph. albus infection of guinea-pig's uterus. Section of a ten-day lesion showing degeneration of epithelium with sub-epithelial cellular infiltration; the connective tissue shows cloudy changes with congestion of blood vessels.

Hæmatoxylin-eosin. X 200

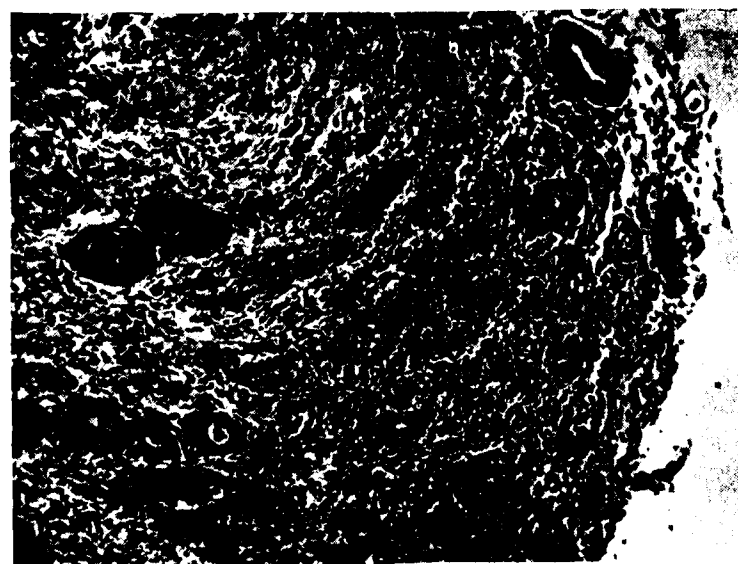


FIG. 8. Staph. albus infection of guinea-pig's uterus. Section of a fifteen-day lesion showing epithelial destruction and prominent cellular infiltration of underlying connective tissue; the glandular epithelium is degenerating, the lumen of many being filled with cell debris.

Hæmatoxylin-eosin. X 200

4 days—The serous coat was acutely inflamed. The inoculated segment was distended and measured 5 m.m. in diameter as compared to 3 m.m. of the normal control horn. The lumen was filled with a cloudy albuminous fluid; mucosa was smooth and oedematous and showed petechiae. Histological sections showed the epithelium to be intact, the connective tissue layer was distended with fluid and slight infiltration with leucocytes and plasma cells.

7 days—The distension of the inoculated horn was very marked, being more than thrice the size of normal horn. The epithelial cells were cuboidal or flattened. The mucosa showed numerous leucocytes and plasma cells. The glands were much reduced in size and appeared to be compressed.

10 days—The lesion was similar to the 4 day reaction with only a slight filling up of the horn with cloudy fluid. The mucosa was oedematous.

15 days—The inoculated horn was very much distended with fluid. Its diameter was 20.1 m.m. as compared to 3.3 m.m. of the control horn. The wall was very thin, tense and parchment-like. The exudate was thin, milky in consistency and contained yellowish flakes. The mucosa was smooth, oedematous and showed congested spots and petechiae. Histological sections showed areas of epithelial desquamation and infiltration with leucocytes and lymphocytes. The connective tissue layer was much reduced in thickness and the glands were small and compressed. The muscular layer was also very thin being reduced to a few fibres, (Fig. 5).

Pure cultures of *Corynebacterium equi* were recovered from the lesions at every stage of the reaction. There were no peritoneal adhesions in any stage of these lesions. The control horn was found to be normal and its structure corresponded to the oestral period at which examination took place (Fig. 6).

Staphylococcus albus (Strain. No. 17/2)

2 days—The inoculated horn appeared normal except for a very slight congestion of the serosa. The mucosa was slightly oedematous, covered with a thin film of serous fluid. Histological sections showed a slight oedematous condition of the connective tissue being infiltrated with leucocytes and lymphocytes.

4 days—The inoculated horn was slightly enlarged and congested. The lumen was partially filled with a serous fluid. The connective tissue was oedematous and diffusely infiltrated with leucocytes and lymphocytes. The epithelium was intact mostly though the individual cells were markedly cuboidal in shape.

7 days.—By this time the reaction was well defined with an enlargement of the segment. The serosa showed congested spots. The lumen was filled with a greyish soupy fluid. The mucosa showed petechiae. Histological sections revealed oedema of the connective tissue and infiltration with lymphocytes, plasma cells and leucocytes. The glands were much compressed and showed desquamation of the epithelium. The epithelial lining of the mucosa was cuboidal to flat.

10 days.—The inoculated horn was markedly distended to about three times the diameter of the normal horn. The walls were flabby and the lumen contained thick, soup-like exudate. Mucosa was brick-red in colour, and showed punctiform erosions. Histological sections showed degeneration of epithelium with sub-epithelial infiltration of lymphocytes, plasma cells and leucocytes. The mucous layer was much thickened, and showed cloudy changes with congestion of blood vessels (Fig. 7).

15 days.—The horn was greatly distended resembling a sausage, with a dark ash-grey serosa (Fig. 9). The wall was soft and flabby. The lumen was completely filled with a mucinous exudate which resembled pus in some parts. The mucosa was dark brown and showed small erosions. Histological sections showed extensive epithelial necrosis and prominent cellular infiltration of underlying connective tissues; the glandular epithelium was degenerating, the lumen of many glands being filled with cell debris (Fig 8). The myometrium appeared to be distended with fluid.

Pure cultures of *Staphylococcus albus* were recovered from the lesion at all stages of infection. The control horn was found to be normal and the structures corresponded to the period of oestrous cycle at which examination took place.

Staphylococcus albus (Strain No. S. 259).

The lesions produced by this strain were similar to those of strain No. 17/2 except that the 4th day lesion was almost normal and resembled the normal control horn. Cultures were recovered at all stages of the reactions.

Discussion

The results of these experiments show that the mode of reaction of the uterine tissues of the guinea-pigs injected with suspensions of *Corynebacterium pyogenes*, *Corynebacterium equi* and *Staphylococcus albus* differed in severity and type.

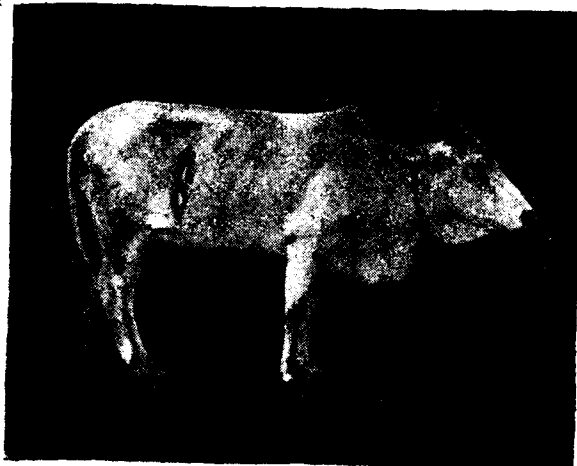
It will be seen that the effect of infection with *Corynebacterium pyogenes* was very pronounced from the outset and progressed rapidly leading to destruction of the tissues culminating in typical pyometra in 4 to 7 days after inoculation. In the early stages haemorrhage into the tissues was a marked feature. The toxic activity of *Corynebacterium*



FIG. 9. Uterus of guinea-pig showing a 15-day lesion in the right horn (left in photo) produced by *Staph. albus*. The broad ligaments which are included in the picture show the blood supply to the uterus.



FIG. 10. Uterus of guinea-pig showing a 15-day lesion in the right horn (left in photo) produced by *C. pyogenes*.



Caesarean Section in a Cow

By
A. Narayanan,
Veterinary Assistant Surgeon,
Srivilliputtur.

[Vide article on page 52]

Cormo - Melodidymi
(Monocephalian Monsters)
in a Pig

By
M. Balasubramanian,
Veterinary Assistant Surgeon,
Virdhunagar.

[Vide article on page 53]



Freak of Nature

By
G. B. Raichur,
Veterinary Assistant Surgeon,
Akkolur.

[Vide article on page 54]



STUDIES ON BOVINE ENDOMETRITIS

7

pyogenes seems to exert a necrotising effect on the endometrium which is more or less completely destroyed, thus enabling the organisms to penetrate deep into the uterine structures. As a result of this the peri-uterine structures were often involved in the process. These observations simulate closely the structural changes met with in suppurative endometritis due to *Corynebacterium pyogenes* infection in cows. In short, *Corynebacterium pyogenes* gave rise regularly to a severe purulent inflammation accompanied by extensive destruction of uterine wall. A comparison of the origin of the strain and the results of the pathogenicity tests failed to reveal any significant difference between strains isolated from endometritis and mastitis.

In contrast, the reaction produced by *Corynebacterium equi* was rather slow and mild. It was characterised by an outpouring of abundant fluid in the early stages; only at a later stage did the exudate become slightly purulent. The inflammatory changes in the endometrium were not marked except for epithelial degeneration and cellular infiltration. The connective tissue layer was much reduced in thickness and the glands were compressed. The marked thinning of the uterine wall was evidently due to great pressure from the exudate. Judging from these results it appears that *Corynebacterium equi* is of low toxicity as compared to *Corynebacterium pyogenes*. However, since only one strain was used, it is not possible to draw any definite conclusion from these results.

Staphylococcus albus gave rise to a typical catarrhal inflammation in early stages. Towards the later stage (after 7 days), the exudate was greatly increased in amount and became slightly purulent. It took about 15 days to give rise to lesions comparable to those produced by *Corynebacterium pyogenes* in 10 days. The histo-pathological changes seemed to pass from an acute stage to sub-acute or chronic stage, resulting in thickening of the mucosa, epithelial necrosis and prominent cellular infiltration of underlying connective tissue, the glandular epithelium was degenerating, the lumen of many glands being filled in with cell debris. The nature of the reaction in general was similar to that produced by *Corynebacterium pyogenes*, though of less intensity.

It is remarkable that these two *Staphylococcus albus* strains which, on the basis of coagulase test would be considered as non-pathogenic, were able to give rise to acute inflammatory changes followed by destruction of endometrium. It is a matter of surmise whether the criterion of judging the pathogenicity of staphylococci by their ability to produce coagulase is a completely accurate guide for judging their pathogenicity in the uterus.

In two guinea-pigs, there was what might be termed an irregular reaction, viz. in one inoculated with *Staphylococcus albus* (Strain No. S. 259) there was no appreciable inflammatory change on the 4th day and in

the other inoculated with *Corynebacterium equi*, the 10th day lesion was similar to that produced in 4 days. These discrepancies are probably accounted for by the difference in the susceptibility of individual guinea-pigs since the culture and technique were the same in all cases.

Summary

1. The lesions produced in the uterus of guinea-pigs by injections of suspensions of *Corynebacterium pyogenes*, *Corynebacterium equi* and *Staphylococcus albus*, all isolated from natural cases of suppurative and catarrhal endometritis in the cow, are described.

2. Bacterial suspensions were injected into ligated segments of the uterus of guinea-pigs. By this method it was possible to follow not only the fate of the bacteria but also the reactions of the uterine tissues in a circumscribed area. With a view to follow the reaction, the guinea-pigs were destroyed at various periods following infection. The gross and histopathology of these uteri have been studied in detail.

3. A study of the progress of the lesions at various stages of infection showed that *Corynebacterium pyogenes* and *Staphylococcus albus* gave rise to typical lesions comparable to those met with in natural cases of endometritis in cows.

4. The paper describes in detail the materials and methods used in these experiments and includes microphotographs of the lesions.

Acknowledgments

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REFERENCES

- STOCKARD, C. R., and PAPANICOLAOU, G.N. (1917) *Am. J. Anat.* **22**, 225.

VACCINATION, VACCINIA VIRUS AND VACCINE LYMPH

By

R. D. KATIYAR, G.B.V.C. P.G. (Mukteswar)

Veterinary Assistant Surgeon,

Government Vaccine Depot, Patwa Dangar, Nainital, U.P.,

Introduction

Small-pox is a disease of great antiquity. In pre-vaccination days, its outbreaks were of frequent occurrence and used to take a heavy toll of human lives. Such was the dread of small-pox that "In pre-vaccination days in England, as in other countries, men declined to marry maidens who had not had small-pox, lest they developed the disease after marriage". (Ministry of Health report No. 8, 1924). Following the introduction of vaccination there has been almost universal decrease in the case mortality rate in recent years and some countries like Japan, Rumania, and Bulgaria have been reported free from disease.

Amongst the animal diseases communicable to human beings, vaccinia has proved to be a blessing in disguise. The earliest and most important advance in immunology was made with Jenner's discovery in 1796, who investigated and established the fact that an attack of cow-pox renders one immune to small-pox.

History of Vaccination

In India and China it was known from very ancient times that inoculation into children of pustular material derived from a mild small-pox case protected them against a severe attack. This practice was known as "Variolation".

Variolation gradually spread westwards till it reached Arabia and Constantinople, from where Lady Mary Montague learned the technique in 1721 and introduced the same in England. The indiscriminate use of Variolation by careless persons sometimes led to increased incidence of disease and the method was ultimately given up as it fell into disrepute.

Suttonian, or arm to arm inoculation:—Sutton, who discovered that the liability to small-pox by Variolation could be eliminated if the pustular material was serially propagated from one individual to another, introduced this procedure of arm-to-arm inoculation during 1764 to 1766. This became popular owing to safety.

The next most important landmark in the history of vaccination was made by Jenner in 1796, who gave scientific explanation to the belief among the agricultural workers that infection of dairy maids with cow-pox rendered

them subsequently immune to small-pox. Since the disease in cattle is called vaccinia, the method of human inoculation with vaccinia material came to be known as vaccination.

Vaccinia virus

Vaccinia virus is a dermo-neurotropic virus. Owing to the ease with which it can be transmitted to the common laboratory animals, it has been extensively investigated in place of variola virus which is difficult to reproduce experimentally.

The origin of the human and animal pox viruses:—Conflicting opinions have been advanced regarding the origin of pox viruses. Jenner and Gordon claimed that vaccinia is the more primitive virus stock and that the others have probably developed therefrom, partly because it is clearly more comprehensive in its infectivity than variola and partly also because it is more potent antigenically than variola.

Findlay has advanced two theories to account for the relationship between the pox diseases:

(1) First, the animal pox disease with variola and alastrim may have evolved from hypothetical primitive pox.

(2) The second possibility is that human variola was the source of the animal diseases consequent on domestication and contact with man.

Characters of vaccinia virus

(1) Does not readily traverse Berkefeld filters.

(2) Can be readily cultivated on tissue cultures.

(3) Dimensions as determined by filtration through graded collodian membranes lie between 0.125 to 0.175 μ .

(4) A number of small coccal bodies, which have been termed elementary or paschen bodies, have been demonstrated in the vesicular fluid of the lesions. The fluid part of the vaccinia lymph which remains after the removal of the 'granules' is found to be quite inactive. These paschen bodies are now considered to represent the actual virus.

(5) According to Bedson and Bland, the vaccinia virus carries a negative charge over pH 6.8 to 8.0.

(6) Guarnieri bodies are always present at some stage in vaccinia lesions. These are intracellular and when stained with methylene blue, show slightly stained spherical mass, lying eccentrically, surrounded by a clear area which, in turn is surrounded by a number of granules.

Resistance of the virus

(1) If kept dry the virus can persist for years at 0°C and for four months at room temperature. Green found that dried virus could withstand 100°C for 5 to 10 minutes.

(2) Whereas bacteria are destroyed by exposure to ultraviolet light for 30 minutes, the virus withstands such treatment.

(3) In vaccinia, the scabs are virus-free in 14 to 15 days, but in small-pox the virus persists for two months.

(4) Like most viruses, vaccinia virus appears to be very resistant to cold and it withstands the temperature of -180°C for months and even repeated freezing and thawing fails to destroy it.

(5) Potassium permanganate is extremely viricidal and destroys it even in a 1/10,000 solution within an hour at room temperature.

(6) Comparatively resistant to glycerine, phenol and ether.

(7) Readily destroyed by heat over 55°C in the presence of moisture.

Antigenic Structure of Vaccinia Virus

The elementary bodies contain two antigenic components known as L (labile) and S (Stable). These components are attached to the surface of the elementary bodies and are also dissociated therefrom into the fluid in which the structures are suspended. The L antigenic component is destroyed at 70°C but resists the action of ether. The S component withstands 70°C.

By suitable immunisation and absorption procedures, pure L and pure S anti-sera could be obtained.

Differences between freshly isolated Variola and Vaccinia Virus

(1) It is difficult to transmit variola directly to calves and rabbits.

(2) Intra-cytoplasmic bodies occur in both, but intra-nuclear inclusion bodies occur most typically in variola and not in vaccinia.

(3) Serum of convalescents from variola causes agglutination of elementary bodies from this disease, but not of vaccinia elementary bodies.

(4) Vaccinia is more potent antigenically than variola. Vaccinia affords protection against itself as well as against variola, while variola protects only against itself.

Strains of Vaccinia Virus

(1) *Dermal Strain*:—This is usually maintained by passage through calves, sheep or rabbits, the animals being vaccinated by scarification.

(2) *Armstrong's heat resistant strain*:—This was obtained by injecting dermal virus intratesticularly and, by heating it at 37°C after each inoculation. By continued selection and propagation, a strain of virus was secured which showed an increase of several hundred times in the length of time it would withstand heat.

(3) *Noguchi's strain of testicular virus*:—The terms Neurovaccine, and Testilapine are also used for it. Testicular passage is frequently employed to increase the virulence of dermal or other strains of virus that have become reduced in potency.

(4) Neuro-vaccinia is maintained by cerebral passage in rabbits.

Antigenically there is no difference in the above strains of the vaccinia virus.

Artificial vaccinia and its complications

Issue vaccine lymph is manufactured here exclusively from healthy buffalo calves 1 to 2 years old. The calves are carefully selected after examination of their age, general health, physical condition and freedom from diseases, specially skin diseases (Mange, Eczema, Ringworm, Leucoderma etc) and contagious diseases like Foot and mouth, Rinderpest and Haemorrhagic Septicaemia.

Large albino rabbits and only those possessing a smooth soft skin free from tufts of guard hair are used for rejuvenation of vaccinia virus.

Cow calves are used for the production of seed lymph from the rejuvenated vaccinia virus. Cow calves with pigmented skin are to be avoided as the seed lymph produced from such calves soon deteriorates in potency and dark pigmentation imparts undesirable muddy appearance to the vaccine pulp.

The preferred animal is the female calf. The male calf is less desirable because of the difficulty in keeping the production area sufficiently clean.

On arrival in the depot, the calves are kept under quarantine for 10 days. Calves showing any evidence of the disease during the quarantine period are rejected. They are well groomed daily by attendants. Their temperature and general condition are recorded and watched by the Veterinary Assistant Surgeon. To protect the calves from chill they are covered with blankets. The daily ration of the calves during their stay at the depot is one pound of concentrates with twenty pounds of chaffed grass.

A day previous to vaccination they are clipped and then bathed with soap and water with the aid of an animal brush. The abdominal area, larger than is to be used for production purposes is shaved with a razor taking care to avoid any cuts in the skin. Seventy per cent alcohol is applied on the shaved area to destroy the natural bacteria of the skin.

Vaccination of calves

Next morning the calf is brought and tied on a tilting table. The abdomen is thoroughly washed four to five times with soap and sterilised warm water. Distilled water is used for final washing. No antiseptic is used.

Some producers find it advantageous to anaesthetize the calf with a suitable barbiturate anaesthetic or chloral hydras administered intravenously before preparing the operative field.

The calf is subsequently vaccinated by making uniform linear scarifications parallel to the muscle fibres with a metal scarifier (Weir) without drawing the blood. The predilection seat for vaccinia virus is the space between dermis and epidermis. The oozing-out of blood through scarifications hinders multiplication of vaccinia virus as defensive mechanism of blood comes into play before the virus gets established in the system; it also reveals that the operator has gone deeper than the predilection seat of the virus. Moreover virus may be washed away before being absorbed. Highly potent seed lymph is applied to the insertions with a spatula. These insertions are two inches long and half an inch apart, and a space of about an inch is left between every two lines of insertions. The spaces occupied by umbilicus, scrotum, groin and flanks are left. The area vaccinated varies from 130 to 200 square inches per calf.

A clean sterilized apron with an opening for micturition is tied over the vaccinated area and it is changed as often as it is soiled. The calves are kept over wooden gratings which are daily changed and disinfected.

Reaction.—Natural cow-pox or vaccinia is a mild benign disease causing local lesions without any acute systemic disturbances. There is little or no rise of temperature though few cases of generalized vaccinia in buffaloes have been reported.

In the artificial vaccinia the temperature starts to shoot up from 3rd day and reaches the maximum, 103° to 104°F, on the fifth day. It starts coming down gradually from 7th day and reaches normal in about 10 days. Sometimes secondary rise of temperature is observed due to complications.

There is always acute conjunctivitis with thick muco-purulent lachrymal discharge. Slight anorexia, lassitude and retarded rumination are also observed.

Papules appear on the 2nd or 3rd day and turn into vesicles containing clear lymph on the 4th day. Continuous slightly raised lines or bands of whitish vesicular tissue extend along the original scarified lines. This tissue is firm and elastic and not easily broken while cleansing in cases of cow calves, whereas in buffalo calves the lesions are soft and break easily. There are single scattering adventitious vesicles from accidental razor scratches. These are round and have a central umbilication. The surrounding skin should have a normal appearance at this stage and there should be no subcutaneous swellings except enlargement of the inguinal lymph nodes and others.

Sometimes these lines of vesicles are surrounded by an area of inflammation and thickening due to seed-lymph containing a large number of

concomitant bacteria. By the action of pyogenic bacteria, the vesicles are transformed into pustules.

In natural vaccinia, scab formation starts after 14 to 16 days, but in artificial vaccinia pustules go into scabs after 6 to 7 days.

Collection of pulp and after treatment

Generally vaccinia matures in 120 hours or 5 days. After this period, the virulence of the vaccinia virus is at its peak. The calf is then put on the tilting table. The vaccinated area is prepared for harvesting by prolonged scrubbing with soap solution and warm water. The final washing is done with sterilized distilled water and the whole area is dried with sterilized towels. The pustules with their contents are gently scraped antiseptically with an inverted Volkman's spoon without drawing blood. Any admixture of blood gives a red colour and potency of vaccine lymph deteriorates early. Each line of eruption is treated in turn and scraped once only. The material collected is called pulp and it is transferred to a sterile collecting bottle of known weight.

After collection of the pulp, the abraded surface is painted with .5% Potassium Permanganate solution and then dusted over with dusting powder containing sulphanilamide. Lesions take 10 to 15 days to heal.

Treatment of Pulp

The pulp is weighed and ground through Chalybus pattern lymph-grinding machine driven electrically. During grinding the requisite quantity of glycerine solution in distilled water with a pH. value of 7.4, previously autoclaved and cooled, is gradually added to the pulp in such proportion that the final strength of the emulsion is 1:5. Grinding is done 3 or 4 times till a fine uniform emulsion is obtained.

Finally the contents are collected and stored in 1000 c.c. graduated bottles and labelled. These bottles are then immediately placed in the cold storage for further purification and bacteriological tests.

Yield

Yield of pulp varies from 50 to 120 gms. per buffalo-calf and 20 to 35 gms. per cow-calf depending on the following factors :—

- (1) Area available for vaccination.
- (2) Potency of the Seed-Lymph.

(3) Climatic variations :—Vaccinial reaction also depends on the atmospheric temperature and humidity, which are optimum at this place (height 5,300 ft.) during the months of September, October and November.

(4) Susceptibility of the calf :—There is variation in susceptibility of the calves to vaccinia virus. On an average 3% of the vaccinated calves fail to react.

(5) Health of the calf.

(6) Brown coloured buffalo calves are more susceptible and yield more pulp than black coloured calves.

(7) Skill of the operator.

(8) Any other infection during vaccinal period specially of virus origin which is dealt with under the heading "complications."

Complications

(1) *Foot and Mouth disease* :—This is of immense importance to the Vaccine Institutes. Foot and mouth virus has been proved to be pathogenic to man. Infection may arise in human beings from vaccination if lymph has been contaminated with foot and mouth virus during its preparation. Vaccine lymph may also be a source of foot and mouth infection in military dairy cattle which are vaccinated with it. The infection of calves and cattle with foot and mouth disease was caused by imported vaccine lymph in U.S.A. (Mohler 1909). Recently, in Norway, vaccine lymph again was believed to be a source of foot and mouth virus which infected cattle (Magnusson 1930).

Several outbreaks of foot and mouth disease in the Vaccine Institutes in India are recorded. It often causes dislocation in the manufacturing work. In 1946, an outbreak of foot and mouth disease took place in our depot 18 days after the cow calves were admitted in the Depot premises. No outside source of infection could be traced. The seed-lymph with which the calves were vaccinated could not be implicated as the second batch of calves vaccinated with the same, did not get foot and mouth disease.

The same thing happened last year in 1948. In Belgaum Vaccine Institute, the foot and mouth disease broke out once 48 days after the calves were admitted in the Depot.

Here arises the doubtful question of latent carriers of foot and mouth virus. It appears that this latent infection flares up during vaccinal reaction.

(2) *Neuro-vaccinia or Meningo-encephalitis* :—Vaccinia virus is a dermo-neurotropic one. Sometimes it generalizes in the system after introduction into skin and its presence in the brain has been demonstrated specially in the rabbits. Vaccinial meningitis has not been recorded, so far I know, in calves. During 1947, I came across two calves with the following symptoms :—

- (1) On the fourth day after vaccination the calves went down.

- (2) Temperature was subnormal 97°F instead of the usual rise during Vaccinial reaction.
- (3) Bending of the neck towards one side.
- (4) The calves were dull, off feed and died within 24 hours.
- (5) On post-mortem, nothing unusual in any organs except congestion of meninges was observed. The spinal cords were removed and, on test for presence of vaccinia virus on rabbits, gave confluent and semi-confluent reaction in 1:1,000 and 1:4,000 dilutions respectively.

This solitary instance of neuro-vaccinia requires further confirmation and investigation.

(3) *Rinderpest*:—This disease may cause havoc in Vaccine Institute if it breaks out during Vaccinial reaction in calves. We protect all our calves by giving 30 c.c. of special A.R.P. Serum as a prophylactic dose. Last year, Rinderpest was raging in a virulent epizootic form in Bareilly and surrounding districts, the areas from which our contractors supplied the calves. Even this 30 c.c. special A.R.P. Serum was not found effective to completely abort the disease and Rinderpest broke out in two batches during vaccinal reaction in a mild form when the vitality of the calves was already low due to vaccinal reaction. As two viruses cannot flourish in the system concurrently and, as the stronger one is bound to suppress the weaker one, about 40% of the vaccinated calves failed to react to the vaccinia virus and in 10% there was very poor reaction.

For differential diagnosis, one should be able to distinguish between the ulcers of Vaccinia, Rinderpest and Foot and Mouth. Vaccinial ulcers have been observed in vaccinated calves either due to licking of the vaccinated area with the tongue by the calves or due to generalization of the virus in the system.

<i>Rinderpest Ulcer</i>	<i>Foot & Mouth Ulcer</i>	<i>Vaccinial Ulcer</i>
(1) On the ventral surface of the tongue.	On the dorsal surface of the tongue.	On the dorsal surface of the tongue and mostly the tip of the tongue is affected.
(2) On level with the surrounding area.	Depressed from the surrounding area.	Comparatively much more depressed from surrounding area.
(3) Ulcer covered with greyish bran-like deposit.	Ulcer clear.	Ulcer covered with red-dish-white necrotic matter.
(4) Regular margin	Irregular margin.	Irregular margin.

(4) *Piroplasmosis, Theileriasis and Coccidiosis*:—Vaccinia lowers the resistance of the vaccinated calves with the consequence that the latent infections mentioned above get flared up. A similar report was received from Madagascar in 1927.

Seed Lymph

Seed lymph is a term applied in Vaccine Institutes for the inoculum employed for vaccinating calves for production of issue vaccine pulp.

It is noticed that in long calf to calf series of vaccinations troublesome subcutaneous swellings of the vaccinated area are apt to occur. It appears that increased virulence of certain concomitant calf bacteria takes place which is responsible for oedema. In addition vaccinia virus gets attenuated by constant passages through the same soil. Hence the necessity of rejuvenating it or restoring its virulence by passing it through susceptible animals such as rabbits skin. The harmful calf bacteria which cannot develop in rabbits are eliminated.

Acknowledgments

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REFERENCES

- (1) Handbook of Filterable Viruses by R. W. Fairbrother.
- (2) Fourth Progress Report of the Foot and Mouth Disease Research Committee of the Ministry of Agriculture and Fisheries, England.
- (3) Ministry of Health Report No. 8, 1924.
- (4) Immunological Reaction of Viruses—*The Australian Journal of Experimental Biology and Medical Science* Vol. V, by Burmet and Dora Lush.
- (5) History and Pathology of Vaccination Vol. I & II by R. M. Crookshank.
- (6) Manual of Vaccination for the Bombay Presidency Part I by R. D. Dalal.
- (7) The Principles of Bacteriology and Immunity by Topley and Wilson.

THE BUFFALO

NEED FOR INTENSIVE STUDIES ON THE NATURAL HISTORY MORPHOLOGY AND PHYSIOLOGY OF THE BUFFALO

BY

D. V. S. REDDY M.B.B.S., M.Sc.

Professor of Physiology

and

K. V. SUBRAHMANYAM, M.B.B.S.

Demonstrator in Physiology

Madras Medical College, Madras.

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Though the buffalo has been, along with the bull and elephant, one of the oldest of domesticated animals of India, there is very little information available, even in veterinary circles, regarding its detailed structure and physiological mechanisms.

There is no doubt that the animal has been used in India from time immemorial. If Siva has a bull for his *vahanam*, the buffalo is the animal over which Yama, the Lord of Death, rides in his perambulations. Death and darkness go together.

Indian literature, especially the epics, give the interesting story of the fight between Devas and Danavas, in which a demon, Mahishasura, with the head of a buffalo, was about to kill Rudra when Rudra's warlike son, Kumara, appeared in a chariot, fought the Mahisha and killed him by discharging his Sakti weapon. Some Indian scholars give an astronomical explanation, namely, that Mahisha the dark-skinned represents buffalo the darkness of winter which puts Devas to flight and Rudra to trouble, and that, in due time, the Sun comes back to the Orion, wields the belt of it as the Sakti weapon and kills the demon. Winter is gone and summer comes.

In South India and Bengal, a different version is current. It is Sakti, the terrible Goddess, that fights and kills the Asura and takes the title of Mahishasura Mardani whom people worship as the Saviour.

Folklore has many allusions to buffalo, specially its slowness in movement and low grade of intelligence, in contrast with the light footedness and stupidity of the proverbial ass.

Daily experience shows that the animal is 'thickskinned'. It does not easily feel the contact of the environment or even the bushy vegetation and the touch of the cane. Any amount of teaching, training and practice cannot improve its natural speed of movement and its reaction

to surroundings and its performance are quite a contrast to the dog and horse. Literature has, however, praised the curd made from buffalo's milk. Kalidasa's couplet is familiar to all lovers of Sanskrit. The early travellers to India were struck by it.

Nineteenth century writers on Natural history and fauna of this country have made interesting observations on the habitat and habits of the Buffalo.

I. Habitat and Habits

(a) According to Jerdon, the author of "Mammals of India", the Valley of the Ganges and Brahmaputra, were their original home in India. They live in dense swampy thickets and lie during the heat of the day in elephant grass or banks of water-ways or ponds.

(b) Stendale, in his book on "Natural History of Mammals", gives as the habitat, the swampy Terai at the foot of hills from Oude to Bhutan, and the plains of lower Bengal, Assam, Central India upto Godavari.

(c) Blanford, in his "Fauna of British India", notes that the wild buffalo keeps chiefly to the level ground and is generally found about swamps. It haunts grass jungles or plains or short grass but does not live in tree forests. It lies down generally in high grass and, not infrequently, in a marsh during the day.

(d) Lydekker, in his "Geographical History of Indian Mammals", states that the Indian buffalo is derived directly from the Ethiopian jungles, and that there are ancestral representatives of buffalo, in the Pliocene and Pleosticene periods.

(e) *The fourteenth edition of Encyclopedia Britannica* refers to the animal as "Water Buffalo".

II. Relation between wild and domesticated buffalo

(a) Jerdon quotes an earlier author "There is no animal upon which ages of domestication have made so small an impression as upon buffalo, the tame species being still most clearly reflected in the wild one".

(b) Blanford also stresses the fact that this animal has not changed in captivity or domestication.

There is thus close similarity between wild buffalo and tamed domesticated buffalo.

One of the common superstitions among the farmers is that beri-beri is caused by eating newly harvested rice of a particular variety mixed with curd made from buffalo's milk. The Ayurvedic books as well as tradition

prohibits the use of buffalo's milk for children and invalids, though modern scientific medicine laughs at these superstitions without investigating the truth.

Apart from all other facts and fancies, there are some very interesting and important features which require intensive study. The first is the structure of the skin with many peculiar characteristics, both macroscopic and microscopic. Though there is a flourishing trade in it, no scientific study of the skin of the buffalo seems to have been thought of or undertaken. Even if the veterinary department is not interested in this particular system, the Guilds and Associations connected with skin and hides, ought to encourage, by liberal donations and prizes, researches into this sadly neglected field.

The second point is that this animal can serve as a very useful experimental subject for investigation on the much neglected but most important problems of the tropics viz., the animal in relation to its physical environment, specially the physiological adaptations of the animal body to the environmental temperatures in tropics. A good deal of work on these lines has been done in Australia on other animals under the direction of Prof. Lee of Adelaide University. The buffalo, with its pigmented skin is a denizen of the tropics. The regulation of temperature of the darker races, black or brown, is not entirely the same as in the whites, in whom the physiology of temperature regulation has been studied in Europe and America. There is, in addition, the effect of adaptation extending over centuries, if not milliniums, of the animal organism to the changing environment of the tropics. A well-planned study of the temperature regulation in the buffalo is therefore likely to be very illuminating and might give valuable clues to the problems of human comfort and welfare.

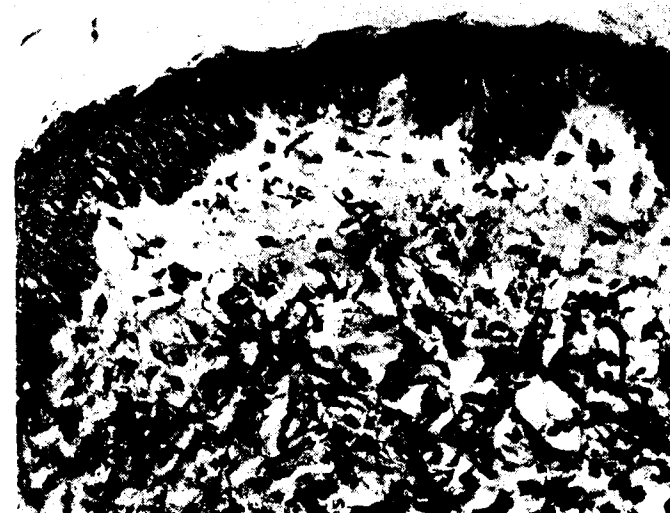
Another question that will fascinate the biologist is the origin and evolution of the buffalo. Though cows and buffaloes are classed as cattle by the common folk, they seem to belong to entirely different races, with different history and geographical distribution. It appears that the buffalo is not only a tropical creature but it seems to have been originally a water animal, like hippopotamus, and later changed on to land—marshy and swampy lands—resembling in this respect, at least, the other friend and martyr of science, the frog, whose living and dissected bodies furnish the knowledge for the foundations of modern medical sciences. The veterinarian and the biologist in India should turn some of their attention from the cats and dogs, to cows and buffaloes, for future research.

In the course of studies on cutaneous pigmentation, nearly a decade ago, the writer's curiosity was aroused, in the subject of the structure of the skin of the buffalo. Letters were sent to many veterinary institutes in

Histological features of the skin of the buffalo



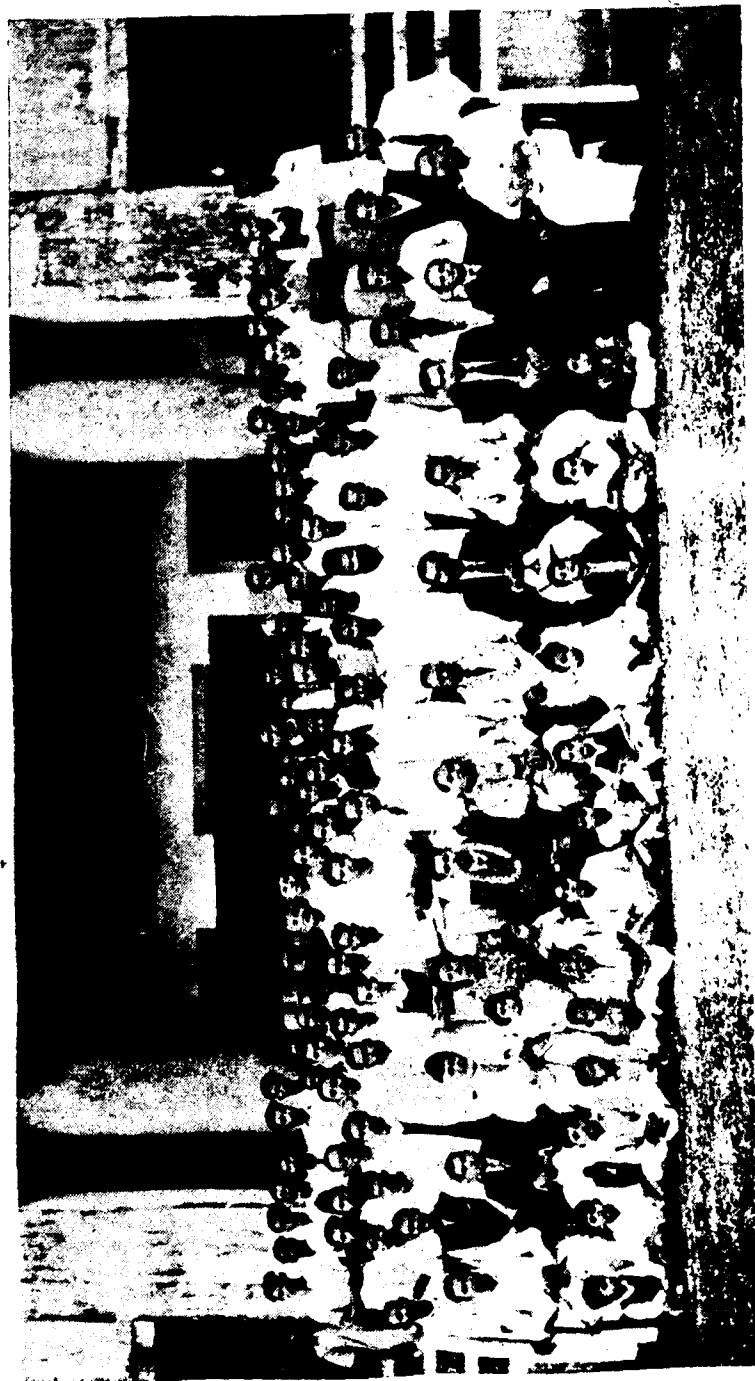
Low magnification. The epidermis is seen as a dark irregular layer covering the dermis which is lighter in shade showing blood vessels, connective tissue cells and bundles, sebaceous glands but no sweat glands.



Medium magnification. The various layers in the epidermis, the disposition of the cells with their nuclei and melanin are clearly brought out. Subadjacent to it is the dermis, the structure of which is seen in greater detail.

ANIMAL HUSBANDRY DEPARTMENT, EAST BENGAL, COMILLA

Group photo taken on the occasion of Retirement of Moulvi Gholam Rahaman, G.B.V.C., on 15-11-49.



Sitting:—S. M. Ali, B.Sc., M.R.C.V.S., (Director) in the centre; on his left, G. Rahaman, G.B.V.C., and on his right Dr. E. Haque, G.V.Sc., M.Sc., Ph.D.

THE BUFFALO

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India enquiring whether there are reports or references, relating to this subject. All the replies received indicated that, till then, no investigation had been undertaken or reported. Pieces of skin were obtained from the Veterinary Hospital at Vizagapatam, and embedded. Unfortunately, before the sections could be got ready for study, the work of the laboratory was disturbed and dislocated, due to the bombing of Vizagapatam during the II World War and the blocks were lost. In 1947, in response to my request, the Anatomy Department of the Veterinary College at Madras kindly supplied me with a few pieces of skin from different regions of the body of a buffalo. Some pieces were fixed in formal and others in Zenker's and embedded in paraffin. Sections were studied unstained and stained (1) with Erlich's haemotoxylin and eosin, (2) Heidenheim's haemotoxylin and eosin (3) Mallory's triple strain (4) van Geison, and (5) Orcein stain for elastic fibres.

Study of the sections under the low power of the microscope reveal the following features. (Fig. 1).

Epidermis appears to be relatively thin, chiefly consisting of only stratum malpighi. Most superficially, there is an interrupted and indistinct layer, showing no cell outlines or nuclei, and constituting a stratum corneum. Stratum lucidum and Stratum granulosum are not seen.

The dermis appears to be much thicker than in human skin. The more superficial outer portion (corresponding to the papillary layer) consists of a very fine reticular tissue, compact and dense, with very few blood vessels and probably without any nerve endings. The deeper part of the dermis consists of coarser connective tissue bundles, which interlace or intercross. This portion has a loose texture and is the thickest layer and most prominent in sections on account of its deep stain and variegated appearance. It also contains most of the blood vessels of larger calibre. A large number of follicles of larger coarser hair are also seen here, generally in association with clusters of sebaceous glands and smooth muscle strands. The roots and follicles of smaller hair are found in the outer dense portion of dermis also. At the junction of the outer and deeper parts of the dermis are seen sebaceous glands, often in groups in a row, with or without a small hair follicle nearby. No special sensory end-organs like Meisner's corpuscles or Pacinian corpuscles are seen in any part of the dermis.

An examination of the sections under the high power of the microscope brought out further details (Fig 2). The epidermis varies in thickness in different parts of the same sections. A few squammas, anucleated and pale, can be made out on the surface. Underneath this layer, appears a thin dark stratum where no cell outlines can be made out. Whether it is part of the St. corneum or St. granulosum can be decided only by further study. The deepest stratum, St. malpighi shows the characteristics of

stratified epithelium. In some portions, this stratum is very thin or narrow consisting of five or six cell layers only. In other portions, where stratum malpighi dips into the corium, the cells are ten to fifteen deep. Both in the thinner regions and in the thicker portions, the stratum malpighi shows the same architectural features (Fig 3) (1) flat cells, containing needle-like or rod-like nuclei in the outermost layers (2) spindle-shaped nuclei in the next one or two layers (3) irregular polygonal cells with oval or round nuclei in the middle of the stratum (4) short columnar cells with oval nuclei arranged at right angles to the surface of the epidermis and forming a regular palisade in the deepest part of the epidermis. The deepest cells, the basal cells are very dark, and loaded heavily with pigment granules, the middle layers also contain considerable amount of pigment, though they appear a shade lighter than the deepest layers.

The most superficial portion of the dermis is seen in this section. It shows dense compact reticular tissue, fine bundles of white fibres and fibroblasts. The dermal papillae are neither prominent nor tall nor regular. There are no blood vessels or nerve ending in the dermal papillae.

Study of sections with the aid of special stains:—(1) Sections stained with Mallory. The entire thickness of the dermis was stained blue, clearly showing that the broad coarse bands in the deepest part of the dermis, looking like smooth muscle, consist of connective tissue bundles. The only muscle fibres that occur are in relation to hair follicle or sebaceous glands, and consist of narrow sheafs of long smooth muscle fibres, situated midway between the dense upper part of the dermis and the deeper part with loose textures. (2) Sections stained with *van Geison's* stain differentiated the epidermis from the connective tissue, and showed its texture and distribution in the dermis. Erector pili muscle and sebaceous glands were easily made out. (3) Sections stained with *Oreocin* showed the presence of elastic fibres in all parts of the dermis.

Measurements of thickness of different layers in micromillimeters.

Stratum corneum	...	7.6 μ
Str. mucosum	...	38 to 95 μ where the epidermis dips as processes into corium.
Hair follicles	...	Diameter of the root of hair 57 μ Thickness of epidermal sheath 38 μ
Corium	...	Compact outer portion 152 μ
Corium	...	Loose-textured deeper layer over 150 μ
Sebaceous glands—(single or groups)		38—150 μ
Further studies will be reported later.		

THE PHYSIOLOGY OF THE ROOSTER SPERM*

BY

C. KRISHNA RAO G.M.V.C., B.V.Sc., M.S. (Calif.)
(Lecturer in Animal Husbandry, Madras Veterinary College)

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Relatively more is known about the spermatozoa of farm animals than about the rooster sperm. Increasing use of artificial insemination has necessitated investigations into the physiology of the spermatozoa of farm animals, more particularly about the dairy bull spermatozoa. Present knowledge indicates that the functional life of the mammalian sperm is restricted to a few hours in the female genital tract. As against this, it is generally accepted that the functional life of the rooster sperm in the oviduct of the hen is about two weeks. This relatively long period of sperm survival in the hen's oviduct had intrigued biologists for a long time but so far no satisfactory theory has been advanced to explain this anomaly. Munro (1938a) reported that the rooster sperms are immobilized at a temperature of 105° F., when mixed with secretions of the infundibulum and magnum, while secretions of the shell gland region were ineffective in immobilising the sperm, thus pointing out the possibility of a similar occurrence in vivo. Warren and Kilpatrick (1929) observed that the rooster sperms lose their tails within twenty-four hours after entering the oviduct. This loss of tails does not seem to affect their fertilizing capacity. Van Drimmelen (1945) reported the finding of active and morphologically normal sperm in the infundibulum on the 8th, 11th, 12th and 14th days after intraperitoneal insemination, in rather small numbers. While the tail of the sperm had, for a long time been considered as the chief locomotor organ, recent work (Zittle and Zitin 1942) has shown that in the bull spermatozoa this structure contains the cytochrome system so vital in sperm metabolism. Van Drimmelen (1945) found the movement of the free tails of the rooster sperm in preparations from the oviduct. Similar observations were made by Rao and Hart (1948) with bull sperm. The process of fertilization is an active one requiring some movement on the part of the sperm and it is possible that the tailless rooster sperm might still be able to move.

It has been considered for a long time that the accessory glands secretions play a very important role in the initiation of sperm motility. Recent work (Rao and Hart, 1948; Rao 1949; Rao and Berry 1949 a; Rao

* This work was done in partial fulfilment of the requirements for the degree of Doctor of Philosophy at the University of Missouri, Columbia. U.S.A.

and Berry 1949 b,) has shown that the sperm of some species of farm mammals collected from the epididymis and ampulla exhibited active motility. The rooster's reproductive tract is peculiar in that there are no accessory glands and yet the ejaculated sperm shows very active motility. Munro (1938b) observed that the rooster sperms from the epididymis and vas deferens do not move, but movement could be induced by dilution with normal saline. The motility of the sperm from the vas was found to be more active than that of the epididymal sperm. He also reports the immobilization of the rooster sperm at 105° F. when mixed with normal saline or the juices from the infundibulum and magnum, while the undiluted semen showed active motility.

The present investigation is undertaken with a view to find some confirmatory evidence to the early work in the several aspects of the physiology of the rooster sperm. For the sake of convenience, this investigation has been divided into different experiments, each of which will be dealt with separately.

EXPERIMENT NO. I.

The fate of the Rooster Sperm in the laying hen

Materials and methods

For the study of the changes that sperm undergoes in the oviduct of the laying hen, six White Leghorn pullets in active production were secured and inseminated with rooster semen ranging in dosage from 0.2 to 0.5 c.c. direct into the oviduct. Two birds were killed 3 and 6 hours after insemination and one each after 12 and 26 hours after insemination. The oviduct was secured within one half hour after the death of the birds and slit lengthwise. The oviduct was divided for the sake of convenience into upper, middle and lower thirds. The recovery of the secretions of the oviduct for the purpose of the examination was done by dropping a small amount of 0.9% saline on the portion of the oviduct concerned, the saline being then thoroughly mixed with the secretions of the oviduct, particularly those in between the mucus folds. The oviduct secretions were then collected on the tip of a glass rod and transferred to a drop of normal saline on a glass slide and well mixed. A drop of 0.4% erythrocin in phosphate buffer or 1% eosin in normal saline was then added to the above mixture and well incorporated. As a routine, the preparation was then examined with a high dry lens and for prolonged examination, to prevent the drying of the preparation, a coverslip was dropped on it, the excess of fluid if any was removed from under the coverslip by applying a filter paper to the side of the coverslip and the preparation sealed all around by using melted paraffin or wax. Such preparations were examined under oil immersion with a magnification of 2,000. Ordinarily, the fresh preparations from the oviduct show very active ciliary movement, which seriously interferes with

the examination for sperm motility, some of the loose cilia being likely to be mistaken for the rooster sperms or for their tails. The addition of the above stains was found to be very helpful not only by the stoppage of ciliary movement but also by the ease with which sperms can be identified in these preparations. Dry smears were also made from the different regions of the oviduct for subsequent examination after staining.

Results

Even within three hours after insemination, no actively motile sperm could be recovered from any part of the oviduct. A few sperms exhibit slight movement after dilution with normal saline, but practically no movement was noticeable when the oviduct secretions were examined direct. In one case, fairly active movement was exhibited by a few sperms on dilution with normal saline, twenty hours after insemination. Morphologically, most of the sperms were found to have lost their tails as early as three hours after insemination, their number gradually increasing till, after twenty-six hours, long-tailed sperms were only rarely met with. The active ciliary movement of the ciliated epithelium of the oviduct was stopped by the addition of a drop of the stains mentioned earlier, thus making the careful examination of the preparations easy. When no stain was added, quite often some loose cilia might be mistaken for the rooster sperms. In preparations to which the stain was added, the sperms were found to take the stain readily, thus becoming easily identifiable. The staining of the sperm too was characteristic in that the acrosome took a much deeper stain than the rest of the sperm head. In these stained preparations, the tail-less rooster sperms were found to exhibit a peculiar worm-like movement, which was unaffected by the addition of the above stains. This peculiar movement was most pronounced in the anterior part of the sperm-head. This type of movement by the tail-less rooster sperm was not described before and might be a factor helpful in the process of fertilization.

EXPERIMENT NO. II.

The effect of the oviduct secretions on the rooster sperm

Munro (1938a) reported the immobilization of the rooster sperm on the addition of the secretions of the infundibulum and magnum, while the shell gland secretions did not have a similar effect. The material from the oviduct was obtained by rolling the oviduct between two thick-walled test tubes. This process of obtaining the oviduct secretions is liable to result in contamination of the secretions with the fatty material on the external surface of the oviduct.

Materials and methods

Two mature White Leghorn hens in production were sacrificed and their oviducts obtained within one half hour after death and the entire

oviduct slit longitudinally open. Rooster semen was then dropped on the different regions of the oviduct and lightly distributed over the surface with a glass rod. The oviducts were then placed in a refrigerator at about 45°F. The material from the different regions was examined after 6, 12, 18, 24 and 36 hours after storage. Material obtained was transferred to a drop of normal saline, mixed thoroughly and examined for motility and morphology. Dry smears were also made as and when necessary for a more detailed study of the morphology after staining.

In another case secretions from the different parts of the oviduct were obtained by lightly scraping the mucus surface with a clean glass slide and the secretions obtained from the different regions mixed with a small quantity of semen separately. Examination of the preparations was immediately carried out first at the room temperature of about 85°F and again after placing it in a hot-air sterilizer adjusted to 105°F. for about five minutes.

In still another experiment, the secretions obtained from the different regions of the oviduct were separately mixed with a small quantity of 5% glucose solution, or 0.9% saline to render them of a fluid consistency and a drop of the material mixed with a small quantity of semen and examined for motility at room temperature and at 105°F.

Results

The secretions obtained from the different regions of the oviduct were of a semi-solid consistency, although this characteristic was most pronounced in the secretions from the albumin-secreting portion. When a small quantity of the secretions was mixed with a small amount of semen and examined at room temperature, it was found that the sperms were all immobilized. When the slide was kept at 105°F. for five minutes and re-examined, the sperms were still non-motile. However, when the sample was diluted with a drop of normal saline, or 5% glucose solution, motility was resumed by the sperm but was not as active as in the original sample of semen. This immobilizing effect on the sperm was exhibited by secretions from all the three regions of the oviduct. When a drop of the diluted oviduct secretions was added to a small amount of semen and examined at room temperature, sperm motility was found to continue although the grade of motility was lower than in the original, undiluted semen sample. When examined after subjecting to 105°F. for five minutes, sperm motility was more active than at room temperature. This feature was shown by secretions from all the three regions of the oviduct.

When semen was dropped on the different regions of the oviduct and kept at 45°F. it was found that the secretions collected from the three regions of the oviduct did not reveal any sperm motility on microscopic

examination, until the viscosity of these secretions was lowered by the addition of some isotonic solution like normal saline or 5% glucose solution. Under these conditions, sperm motility was found to be quite active for about 36 hours after storage at 45°F. Morphologically, the sperms were found to be normal and long-tailed.

EXPERIMENT NO. III.

The development of motility in the Rooster Sperm

Materials and Methods

Six white Leghorn yearling roosters were obtained for this study. Semen from all these birds was first obtained by the abdominal massage technique and checked for quality before they were sacrificed. The entire male reproductive tract was dissected out within one half hour after the death of the roosters. The epididymis was carefully dissected from the testis and then severed at the region where it joins the vas deferens. Material from the testis was obtained by holding the testis firmly and then lightly incising on the surface with a sharp scalpel, a drop of the oozing fluid then collected on a clean glass slide spread out thinly and examined immediately under the microscope. The drop of the testicular fluid was then diluted with a drop of saline, or 5% glucose solution, separately and examined for motility at room temperature and again at 105°F. The contents of the rudimentary epididymis were obtained by holding the proximal end of the organ with a pair of tweezers and drawing another pair of tweezers along the epididymis from the proximal to the distal end applying pressure on the organ to expel the contents. The epididymal contents were then collected on a clean glass slide and handled the same way as the testicular contents. The vasa deferentia were severed at the distal end, where they opened into the genital papillae and their contents squeezed out with a pair of tweezers and handled in the same way as described earlier. Dry smears were made from the different regions for study after staining.

Results

The testes of the roosters were large compared to their size and rather soft in feel. On incision, plenty of fluid came from the testes. The testicular material, when thinly spread out and immediately examined, showed distinct and active movement of the spermatozoa, which was greatly enhanced by the addition of a drop of normal saline or 5% glucose solution. This movement was further accentuated after maintaining the slide at 105°F. for five minutes. The material obtained from the testis was rather low in viscosity. The epididymal contents, when spread in a thin layer and examined, showed very active sperm motility with the characteristic wave formation and this motility was further increased on the addition of a drop of the above isotonic solutions. Motility of the

epididymal sperm was maximal, when the diluted material was subjected to 105°F. for five minutes before examination and the motility was comparable to that exhibited by the ejaculated sperm. The contents of the epididymis were fairly viscous and the sperm concentration was also very high, with the result that the free expression of sperm motility was seriously hampered by the above factors. The contents of the vas deferens were less viscous than the epididymal contents and more viscous than the ejaculated semen. The sperm from the vas exhibited maximal motility when examined immediately after collection, motility being further accentuated on the addition of a drop of isotonic solution. Subjecting the diluted sperm from the vas to 105°F. elicited the maximum response with the result that the wave-and-eddy-formation was very pronounced. There was no marked difference in the grade of motility exhibited by the epididymal sperm and the sperm from the vas after dilution with saline or 5% glucose solution. The undiluted epididymal contents showed a slightly less active motility than the sperm from the vas, owing to the greater viscosity and higher sperm concentration.

Discussion

Warren and Kilpatrick (1929) first reported that the rooster sperms lose their tails within 24 hours after insemination and that even after six hours many of the sperms were tail-less. The present investigation shows that the loss of the tail occurs as early as three hours after insemination and that after twenty-six hours long-tailed sperms are extremely rare. The rapidity with which this loss of tails occurs is rather surprising. The break in the tail occurs most frequently at the junction of the head and the body but occasionally it may occur in any part of the tail. The mechanism of the loss of the tail requires further investigation. The powerful ciliary movement in the oviduct of the laying hen might be a factor in causing the breakage of the tail particularly in view of the great length of the oviduct in the laying hen. Since the neck of the sperm is the weakest spot, it is natural that the break should occur at that region. On the other hand the possibility of this breakage being of an enzymatic nature cannot be ruled out. The finding that the sperm heads are capable of independent movement is surprising and interesting, since tail-less sperm heads of the bull, ram, buck, stallion, jack, boar and a variety of other animals are incapable of movement and what is more important, these tail-less sperms in the species mentioned are dead sperms. Since the heads of the rooster sperms are capable of independent existence for a considerable length of time after the loss of the tails, they probably have the enzyme systems concerned with their metabolism in the sperm head itself rather than in the tail, as in the case of the bull sperm (Zittle and Zitin 1942). The movement exhibited by the tail-less rooster sperm is peculiar, worm-like and very slow. In the fresh preparations of the oviduct, the search for

the rooster sperm is rendered difficult by the very powerful ciliary movement of the ciliated cells lining the epithelium of the oviduct, which sets up currents in the field and causes confusion. The addition of a drop of 0.4% erythrocine in phosphate buffer, or 1% eosin in normal saline, was found to have the combined advantage of stopping the ciliary movement and also staining the sperm, thus making them more easily detectable. In such stained preparations it was found that the acrosomes of the rooster sperm took a much deeper stain than the rest of the sperm head. It was interesting to note that the sperm heads were still motile even after taking the stain. Morphologically, no marked changes were observed in the shape of the head after the loss of the tail. Numerous free tails could be found in preparations from the oviduct in stained smears and these can be distinguished from the loose cilia by the fact that the body of the sperm at the anterior end of the tail is distinctly thicker and takes a much deeper stain than the tail proper, while the loose cilia take a uniform stain throughout their length.

Munro (1938a) reported that the rooster sperms are immobilized by secretions of the infundibulum and magnum at a temperature of 105°F., while the secretions of the shell gland region did not have a similar effect on sperm motility. The results of the present investigation indicate that the rooster sperms are immobilized by the secretions from all the three regions of the oviduct even at a room temperature of about 85°F., this effect being mainly due to the high viscosity of the secretions. The oviduct secretions, which are of a semi-solid consistency do not permit the free movement of the sperm, these being bogged down by the very thick secretions. Thus, it appears that the immobilizing effect is due mainly to factors of a mechanical nature than to any specific effect of the temperature-media interaction. The finding that the diluted oviduct secretions did not have any immobilizing effect on the sperm either at room temperature or at 105°F. is further evidence against the theory of specific interaction of the temperature and media causing immobilization of the sperm. It was actually found that at a temperature of 105°F. the rooster sperm mixed with diluted oviduct secretions showed more active motility than at 85°F. Munro (1938a) also reported that the rooster sperms were immobilized at 105°F. when diluted with normal saline, while the undiluted semen showed active motility. The evidence gathered from the present investigation demonstrates that active motility of the rooster sperms was exhibited by both the undiluted semen and semen diluted with saline, at a temperature of 105°F.

While earlier work (Munro 1938b) claims that the rooster sperms recovered from the male reproductive tract do not show any motility, unless diluted with some diluent like normal saline, it should be recognised that the technique of dealing with a certain material has a great bearing on

the type of results obtained. In the present investigation, sperms from the testis showed very definite evidence of motility, which was quite active. This is in contrast with the observations on the testicular sperm of the farm mammals, which show very poor motility (Rao and Hart 1948; Rao and Berry 1949a, 1949b). The motility of the rooster sperm from the testis was very much invigorated when the testicular material was diluted with a drop of normal saline or 5% glucose solution and subjected to 105°F. for five minutes. In this connection it is important to point out that the testicular material should be spread out in a thin layer with the edge of a clean glass slide before microscopic examination. The testicular contents were fairly viscous but not so much as to inhibit sperm motility. Sperms recovered from the epididymis were found to be in maximal motility as evidenced by the formation of waves and eddies and this was further accentuated by the addition of a drop of the isotonic solutions mentioned earlier and subjecting to 105°F. Here again the spreading of the material in a thin layer is of the utmost importance but examination should be carried out quickly before the material dries up. The sperm obtained from the vas deferens were also found to be in maximal motility, this movement being further enhanced by dilution and higher temperature. No difference in the grade of motility was observed between the epididymal sperms and those from the vas deferens, particularly after dilution. The epididymal contents were more viscous than the contents of the vas. Motility exhibited by the sperm from the above regions was as active as in the fresh ejaculate. The tremendous copulative power that the rooster has is quite well known to all who have some experience with poultry. In the case of the farm mammals like the bull, stallion, ram etc. the epididymis is considered to be the main reservoir for sperm and this organ is very well developed in these species. In the rooster, however, the epididymis is rudimentary and has little or no storage capacity to speak of and it is probable that in this species the unusually large testes themselves act as the storage places for the sperm, since even the capacity of the vasa deferentia is limited. Further, in some species, there is additional provision for the sperm storage by the dilatation of the terminal ends of the vasa deferentia to form ampullae, which condition does not exist in the rooster.

Conclusions

The rooster sperms lose their tail as early as three hours after insemination, the number of tail-less sperm increasing with time, till, after twenty-four hours, long-tailed sperms were only occasionally met with. The tail-less sperms do not undergo any marked morphological changes and are capable of a peculiar slow, worm-like, passive movement.

The secretions from all parts of the oviduct were found to immobilise the rooster sperm both at a room temperature of about 85°F. and at 105°F.,

this being due, mainly to the high viscosity of the secretions, since motility was at once resumed on the reduction of viscosity in the preparations by the addition of a drop of isotonic solution. Active motility was exhibited by the sperm, when semen was mixed with oviduct secretions diluted with saline, or 5% glucose solution, the motility at 105°F. being greater than at 85°F.

The testicular contents were low in viscosity and fairly active sperm movement was noticeable in testicular preparations, this movement being enhanced by further dilution with isotonic solutions and higher temperature. Active sperm motility was observed in preparations from the epididymis and vas deferens, the difference in the degree of motility between preparations from the two regions being negligible. It appears that the testes act as reservoirs for sperm in the rooster.

Acknowledgments

The author wishes to acknowledge his thanks to Dr. Dennis T. Mayer of the Animal Breeding Laboratory, University of Missouri, for technical guidance and to Prof. H. L. Kempster, Head of the Poultry Husbandry Department for his encouragement and co-operation.

BIBLIOGRAPHY

- I. Munro, S. S. "Fowl sperm immobilization by a temperature-media interaction and its biological significance." *Quart. Jour. Exp. Physiol.* 27 : 231-297. 1938a
- II. Warren, D. C. and Kilpatrick, L. : "Fertilization in the domestic fowl." *Poultry Sc.* 8 : 237-256. 1929.
- III. Van Drimmelen, G. C. : "Location of spermatozoa in the hen by means of capillary attraction." *J. S. Afr. Med. Assn.* 16 : 97-101. 1945.
- IV. Zittle, C. A. and Zitin, B. : "The amount and distribution of cytochrome oxidase in bull spermatozoa." *J. Biol. Chem.* 144 : 99-104. 1942.
- V. Rao, C. K. and Hart, G. H. : "Motility of bovine spermatozoa." *Am. J. Vet. Res.* 9 : 286-290. 1948.
- VI. Rao, C. K. : "The morphology and development of the spermatozoa of the stallion and the Jack." *Ind. Vet. J.* 25 : 305-309. 1949.
- VII. Rao, C. K. and Berry, R. O. : "Observations on the protoplasmic drop and protoplasmic cap in sperm development in domestic sheep, domestic goats and wild Barbary sheep (*Ammotragus lervia*)." In print, 1949a
- VIII. Rao, C. K. and Berry, R. O. : "The cytoplasmic drop and the cytoplasmic cap in the development of boar spermatozoa." *Am. J. Vet. Res.* 10 : 357-360. 1949b.
- IX. Munro, S. S. : "Functional changes in fowl sperm during their passage through the excurrent ducts of the male." *J. Exp. Zool.* 79 : 71-92. 1938b.

OBSERVATIONS ON THE BEHAVIOUR OF WHITE LEG-HORN FOWLS UNDER DOMESTIC CONDITIONS

BY

GOPAL SINGH RATHORE, D.V.M.,

Animal Husbandry and Veterinary Officer, Udaipur

In India foreign breeds of fowls viz., Rhode Island Reds, Black Minorca and White Leg-horns have been bred and brought up in many poultry farms where they are kept under ideal conditions. But how these birds will behave if kept under domestic conditions, as is usually done in Indian cities or villages which are vastly different from the poultry farms, is not well known. I thought it might be useful to try out an experiment on a few birds and give them the least care, minimum amount of food and maintain them under home conditions. The following observations in course of trial were recorded.

On 20th February, 1949, one cock and five hens of the White Leg-horn breed were transferred to the City Veterinary Hospital from the Government Poultry Farm, Udaipur. No special arrangements for their management were made. The birds were to be let out in the morning, allowed to wander all throughout the day and housed in a pukka cage of 2½ feet high and 3 feet in length and 2 feet deep which had only barred door for ventilation and closed on three sides. In this cage all these birds in addition to three more Deshi hens were kept. This Hospital is visited by all kinds of animals, from a Camel to a Guinea Pig and Fowls, with all sorts of diseases. These birds were allowed to roam freely even during the hospital hours, so that they had every opportunity to come in contact with the diseased animals and their discharges. They could pick at the excreta of the indoor patients too.

These birds were fed about half an ounce of grain mixture per day per head in the morning only. The mixture consisted of equal parts of Gram, Wheat, Barley and Maize. In the beginning, a bunch of lucerne was thrown to them as they were used to eat this at the farm and later it was replaced by cut Dhub Grass. It was observed that in the beginning they ate the greens lavishly but after about 3 months they showed disinclination for it, and after about 5 months, they did not pay much attention to, much less eat, the greens.

These birds were transferred from the Government Poultry Farm, Udaipur. This Farm breeds and maintains Rhode Island Red, Black Minorca and White Leg-horn fowls. From this farm, we sell eggs to the public for hatching at nominal rates and supply cockrels and pullets in exchange of Deshi birds and also on Bird-Loan System. The birds which are received in

exchange are sold for table purposes. The aim of maintaining a farm is to encourage the public to keep good fowls and improve the Deshi fowls by crossing with our pure bred cocks which we supply.

These birds that were transferred to the City Veterinary Hospital from this farm for experimental study were used to all care that could be possible on an ideal modern poultry farm. They were fed on balanced ration; strict attention was paid to their hygiene and they were protected against inclemencies of weather. All the same, the birds selected from such a stock thrived well under the domestic conditions.

In the beginning, they gave on an average 3 eggs per day between 5 hens. During the month of May, i.e. about three months later, the egg production fell from 3 to 2 eggs per day. These birds started moulting in the month of June and this lasted till the end of August (a period rather longer than that on the farm).

On June 14th, 1949, one hen died and, on postmortem, fowl leucosis was diagnosed. This bird was replaced by a new Black Minorca hen with a view to crossbreed her with White Leg-horn cock. To my surprise, I noted that this black bird was not welcomed by its white sisters or the cock, and, for about two months, she had to live separately from the others. The White Leg-horn birds used to peck at her and drive her away from their group and the cock also sided the white hens. The White Leg-horns did not even allow the Black bird to pick up the grain thrown on the ground. Therefore, she had to be fed separately at the time of feeding. In the beginning, the cock did not serve the black hen for about 1½ months, but, later on, the cock started treading her when she was away from other hens. To find out whether this kind of indifference and enmity was due to colour-bar among the birds, or due to strangeness of the new-comer, I introduced a pure White Deshi cross-bred hen in this group. Strangely enough, this White Deshi bird was not unwelcomed by the other White Leg-horn birds as the black one nor did they maltreat her. This shows that birds too have some colour prejudice against other colour birds though they may be of the same race. Even now, after 3 months of their being together, the Black Minorca hen has not been able to develop friendship with her white sisters or mix with them freely. Even the cock does not move with her so often as he does with the white ones, except when he wants to mate her. Immediately after, he goes back to the group of white hens whereas the white Deshi hen has become almost one of them in their group. This is a good case for biologists to experiment and throw more light on the mind of fowls and their behaviour towards different colours. In my opinion, it is either a colour prejudice or it is because white hens are in a majority and there was only one black so that they just can't allow her to mix. But can the hens recognise their own colour and differentiate it from other ones? This has to be proved.

In the month of September, 1949, these birds started laying again and the average egg production was about 1 ¾ eggs per day from 5 hens. The

quality of the shell of the eggs seemed to have improved, as it was found to be harder, smoother and thicker than those of the farm birds. The size and the average weight of the eggs remained unchanged but the average production had decreased nearly by half to what it was at the farm. In the new place, we did not give them bone meal or fish meal, nor meat offals or greens. We do not also give any grit as there are plenty of small stones which the birds pick up. The birds on the whole are quite thrifty and alert. These birds were once treated with sulfarsenol to protect them against spirochaetosis (as this disease is common here in fowls) and are often dusted with Gammaxene to prevent lice, ticks etc.

Conclusion

I can say that, in these eight months, the experiment which I have made on these foreign breed fowls make me believe that, if they are kept under domestic conditions and if they are fed at least half an ounce of grain every day, the fowls can thrive well in our cities or villages. Only thing needed is that, one should take care of ticks, lice etc. and if the birds fall sick, they should be taken to the poultry expert for diagnosis and proper treatment. Though the egg production decreases under such circumstances, still they give more eggs than our Deshi hens and the size of the egg is definitely bigger and the quantity of meat per head of these fowls is more. But such experiments have to be done for two or three generations to give us definite results as to how they behave in subsequent generations.

CANINE FEVERS WITH SPECIAL REFERENCE TO SALMONELLOSIS

By

SRI HARJAS RAI, MAHAJAN and SANKARNARAYAN N. S.

Ajmer

It is customary in all Veterinary Hospitals to suspect a canine case with persistent febrile symptoms for Piroplasmiasis and treat it accordingly. When blood smears could be examined, an examination is carried out; in negative cases, symptomatic treatment is all that is required to bring about a cure, if such cases are not of distemper. Besides these 'fevers' there is the Lahore Canine Fever reported by Shirlaw (1938) and later confirmed by Chet Ram (1940) which again is caused by *Piroplasma gibsoni*. Sometimes this may be mistaken as pyrexia of unknown origin due to the difficulty in detecting the organisms in blood. As their presence in blood is of a recurrent nature, a sure diagnosis could be arrived at only if smear examinations are carried out for successive days or when the patient shows high rise of temperature. Marked anaemic changes which follow Piroplasmiasis help to diagnose the disease although a definite line of treatment could be adopted only after the organisms are detected in blood smears. In dealing with Canine

fevers one has to bear in mind that besides the cases mentioned above there are those which are supposed to be of unknown origin. Un-known it is termed not because the cause is unknown, but because facilities for laboratory examinations are not available in the field to discover the cause in individual cases. The aetiology of such cases which may be bacterial origin could be satisfactorily worked out only in a laboratory.

Fever of unknown origin :—Recently we have come across quite a large number of cases of Canine fever resisting the usual line of treatment. In August 1949, a terrier belonging to one of the local officials was brought to the hospital with a history that the animal was dull and completely off feed. It had a temperature of 106°F; blood smear examination proved negative for piroplasmiasis or any other protozoan organism, but leucocytosis was evident; hence a differential count was made with the following results :—

Polymorphs.	Eosinophiles	Monocytes	Lymphocytes.
80	1	10	9

Symptomatic treatment :—The result of the differential count is indicative of an inflammatory condition, but no visible sign of inflammation was, however, noticed except the running temperature. The dog was treated symptomatically with no effect. When resting, the animal was noticed lying on its belly with the hind limbs thrown back and forelimbs forwards which is usually a sign of abdominal pain and a contrivance to get relief by mechanical pressure. Hence the animal was suspected to be having digestive trouble and treatment accordingly changed to stomachic tonics and internal antiseptics; simultaneously, faeces examination was also carried out for helminth parasites. Faeces examinations proved negative and the treatment produced no effect.

Bacteriological Examination :—On further enquiry, the owner reported that the dog in question was in the habit of chasing and catching lizards, squirrels and such animals found generally in and around houses and bungalows, and, just before its sickness, it had actually killed a lizard and it was suspected that the lizard was eaten up. Lizards are popularly believed to be poisonous and it is well known that their droppings often produce food poison. Hinshaw and Mc. Neil (1947) isolated from Pacific fence lizards *salmonella rubislaw* which belongs to a class of organism producing food poisons in man and animals and from the same group of lizards two sucrose positive paracolon were also isolated.

Laboratory examinations :—The results of differential counts also prove that this canine case is of inflammatory nature possibly of bacterial origin. As Kachanov and Edelshtein (1937) found leucocytosis in the blood picture of calves infected with *Salmonella* or vaccinated against it, a bacterial examination was decided and samples of faeces on two consecutive days were sown in Macconkey plates and incubated for 24 hours at 37°C. The plate showed clear, whitish or pale colonies along with numerous pinkish ones. The

whitish ones were picked up and sown in broth. The organisms from a 24 hours' broth culture were found to have the following characteristics :—

- (1) Short, thin rods or cocco-bacillary.
- (2) Gram negative.
- (3) Actively motile.

Diagnosis and Treatment :—For want of suitable media and reagents for bio-chemical tests and small animals for biological and serological tests, further investigation in this direction had to be abandoned and immediate steps to relieve the dog were taken. From the history and laboratory examination so far carried out and the resistance of the case to all ordinary treatment adopted, a diagnosis of Salmonellosis was made and treatment given accordingly. Donald R. cordy, Robert and Davis (1946), investigating an outbreak of Salmonellosis among army horses and mules in India, successfully treated individual cases by administration of Sulphaguanidine. Penn (1947) found sulphaguanidine and bismuth preparations effective in salmonella infections in minks. In the place of sulphaguanidine which was not available, Cibazol was administered daily 6 tablets, 3 in the morning and 3 in the evening and continued for three days. On the third day itself the dog was showing signs of activity and taking milk diet. The sulpha drug was continued for another 2 days with 4 tablets daily and the dog was discharged completely recovered.

A second case of terrier belonging again to a well known local official followed the first. In this case, although there was no history of lizard-chasing and catching, the dog showed identical symptoms which proved persistent in spite of symptomatic treatment. Blood examination revealed leucocytosis with no protozoan parasite. Cibazol was resorted to and the same dose was given. On the fourth day this case also started feeding. Milk and soup for diet with digestives were prescribed and the dog was discharged.

The third case again was a terrier. Blood and faeces examinations proved negative for protozoa and helminths respectively. Here again symptomatic treatment was of no avail and the animal was cured by cibazol. Next case was a pure-bred Labrador belonging to a well-known local dog-lover. There was no history, but symptoms and results of blood and faeces examinations were identical; hence on the basis of previous experience, this case also was treated successfully with cibazol.

The fifth case, a watch dog of mixed breed, was also successfully treated with cibazol as a result of blood and faeces examinations after unsuccessful symptomatic treatments.

Discussion :—In all the above cases the diagnosis of salmonellosis was beyond doubt although laboratory evidence was not complete. From a perusal of the literature available at hand the following is worth mentioning in this connection. Hanson (1947) in his examination of faeces of various domesticated

animals and food stuffs of animal origin found Salmonella in dogs. Wolff Henderson and Mc. Callum (1948) reported that 16 out of 100 dogs examined bacteriologically found excreting 16 different salmonella types of organisms including types similar to those infecting man. Rislakki (1946) in his study of salmonella infection found salmonella in dogs. From the above reports mentioning the susceptibility of dogs to Salmonellosis, the clinical symptoms and their resistance to ordinary treatment and the successful treatment with cibazol are proofs enough to conclude these cases as salmonella infections. It is important to note that all these cases under report belong to well-to-do owners and they are well looked after, getting wholesome and clean food and, in spite of the fact, that these dogs are always confined to the house or compound, it is not known how they got the infection. Except in the first case, no information is available as to the origin of infection.

There is a considerable body of evidence to indicate that the infection is introduced generally through feed. Sakavarelidze and Amirkhanov (1937) reported that lactating cows could spread Salmonella infection through milk and faeces. Frank and Schofield (1945) also found that Salmonella infection in animals was mostly through gastro intestinal tract and this must be due to contaminated food. The information in our hand regarding the cause is unfortunately incomplete; but it is quite likely that these dogs might have got the infection either through milk or meat fed to them.

There is no easy way of diagnosing salmonella infection in animals except through the agency of a bacteriological laboratory. Since leucocytosis is not a specific symptom, differential count is only an aid to diagnosis. It is a fact, however, that field veterinarians are not required definitely to diagnose Salmonellosis but only to suspect from a reliable history. It has to be remembered that a dog suffering from continuous fever may well show symptoms that might tempt the practitioner to diagnose it as salmonellosis and start treatment accordingly. For routine purposes, it has been proved practicable and satisfactory to base the diagnosis on the clinical appearance and history and to effect a cure by ordinary treatment. Such diagnosis may be confirmed by sending faeces samples to the nearest bacteriological laboratory well preserved for examination.

REFERENCES

1. Shirlaw J. F. (1938) Indian J. Vety. Animal Husbandry.
2. Chet Ram (1940)
3. Hindshaw W. R. and Mc. Neil E. (1947) J. Bact 53. 715
4. Kachanov G. A. and Edel'shtein I. A. (1937) Trudsezoynuz inst. Cksp. Vet. 14 79.
5. Donald R. Gordy and Rober W. Davis Capt. (1946) Indian Vety. Journal XXIII-I-20.
6. Penn K. K. (1947) Amer Fur. Br. 19-33
7. Hansen A. C. (1947) Maanedsskr Dyrlaeg. 58. 399.
8. Wolff A. H., Henderson N. D. & Mc. Callum G. L. (1948) Amer. J. Publishing Hith. 38-403
9. Rislakki V. (1946) Skand Vety. Tedskr. 36-193
10. Sakavarelidze V. Z. & Amirkhanov G. I. (1937) Trud Resezoyuz Inst, Cksp-Vety. 14 89.
11. Frank W. and Schofield (1945) Canad J. Comp Med. 9. 62.

CATTLE FEEDS—THEIR PRESENT POSITION IN MADRAS STATE

By

C. VENKATESWARA RAO, G.M.V.C., B.V.Sc., M.Sc.

Madras Veterinary College.

It is a well known fact that the cattle feeds of this province are far short of the requirements. In recent years, the position has become worse for the reasons stated below. Driven by abject poverty, the ryots of this province have been using every bit of arable land for growing food crops which bring them immediate money. Not only this, the industrialists have tempted the cultivators to use the soil for growing cash crops like tobacco, sugarcane, etc. This is supported by the findings of Krishnaswami (1947) which state that about 7 million acres of arable land in this province has passed from food crops to commercial crops. Thus no thought was ever seen to have been given to keep in reserve a portion of available arable land for the cultivation of fodder crops. Therefore, the cattle of this province have been eking out a miserable existence on roughages like straw which is also not available in any desired quantity. However, no attempt seems to have been made so far, to find out the actual position of the cattle food in relation to the requirement for maintenance and production. Therefore, an attempt at the quantitative survey of the actual position is considered essential which would help also to prevent further deterioration in the position and to devise definite plans for improvement.

Food requirements of animals:—Livestock census figures collected from Season and Crop Report of Madras (1944-45) have been used for arriving at the requirements of the stock. Sheep, goat and equines have been omitted from the calculation, since the sheep and goats subsist usually on shrubs, bushes and stubbles, and the equine population of this province is negligible. The feeding standards of Morrison as adopted by Sen (1948) have been followed for estimating the requirements. The requirements for maintenance and production have been shown separately in Table I. A perusal of the table shows that as much as 50·900 million tons of dry matter, 1·2913 million tons of digestible crude protein and 11·3631 million tons of starch equivalent are found to be necessary for the maintenance of the adult cattle alone. About 0·6672 million tons of starch equivalent and 0·1067 million tons of digestible crude protein are estimated to be necessary for a total of 1·973 million tons of milk produced at present both from buffaloes and cows. Young growing stock, if fed well, alone will consume 4·599 million tons of dry matter, 3·415 million tons of starch-equivalent and 0·5764 million tons of digestible crude protein both for growth and maintenance. The only single factor, viz. the production of work

TABLE I
Requirements of nutrients for livestock per year.

Particulars	Number	Average live weight in lbs.	(3)	Dry matter.		Digestible Proteins		Starch Equivalents.	
				per 100 lbs. live weight per day	Total per year in million tons	Per head per day-lbs.	Total per year in million tons	Per head per day-lbs.	Total per year in million tons
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CATTLE & BUFFALOES:									
(a) Maintenance:—									
Cows over 3 years in milk	18,04,058	700	2.7	5.635	0.44	0.13048	4.09	1.1116	
Cows over 3 years dry	21,55,962	700	2.4	5.820	0.44	0.1509	4.09	1.4013	
Cows over 3 years not calved	10,06,593	700	2.4	2.726	0.44	0.07067	4.09	0.6562	
Buffaloes over 3 years in milk	15,69,658	850	3.2	6.855	0.52	0.12604	4.835	0.906	
-do- dry	9,26,120	850	2.8	8.612	0.52	0.0744	4.835	0.6529	
-do- not calved.	4,23,836	850	2.8	1.653	0.52	0.0339	4.835	0.2980	
Total for milch animals				26.937		0.58639		5.028	
(b) Production:—									
Cows over 3 years for work	5,94,540	700	2.2	1.4304	0.458	0.0432	4.09	0.3959	
Bullocks or bulls for work	96,46,556	900	2.2	13.07	0.57	0.51739	4.09	4.669	
Bullocks or bulls not in use in for work	3,60,759	900	2.2	0.1540	0.458	0.0265	4.09	0.2890	
Buffalo cows for work	77,150	750	2.8	0.30962	0.52	0.006713	4.83	0.0594	
Buffalo bullocks for work	10,10,368	800	2.8	3.670424	0.520	0.053557	4.83	0.74534	
Buffalo bullocks or bulls not in use	1,16,729	700	2.2	0.28515	0.458	0.00853	4.09	0.767	
She-buffaloes not in use for breeding or work	46,053	750	2.8	0.1759	0.52	0.0040	4.835	0.03546	
Cows over three years not in use	1,93,026	700	2.2	0.46407	0.44	0.014	4.09	0.1274	
Total				24.56360		0.7049		6.3371	
Total for maintenance				50.90060		1.2913		11.3631	
(b) Production:—									
MILK:—									
Cows	0.976	million tons	4% fat			0.04392		0.2684	
Buffaloes	0.997	-do-	7% fat			0.06281		0.3988	
Total for milk	1.973					0.10673		0.6672	
WORK —									
Total for work production						0.0627463		3.21575	
Total for production						0.16673		3.893	
(c) Growth including maintenance									
Calves 0 to 1 year. Cattle	17,55,642	100	2.0	0.5615	0.32	0.08954	1.5	0.43135	
Buffaloes -do-	12,49,840	120	2.2	0.5207	0.36	0.07539	1.8	0.37219	
Young stock 1 to 3 years cattle	18,49,644	300	2.2	1.9421	0.73	0.2034	4.5	1.3517	
Buffaloes	8,27,283	350	2.4	1.0754	0.79	0.2065	4.9	1.5409	
(d) Breeding									
Cattle	91,144	900	2.2	0.291	0.57	0.000925	5.08	0.00746	
Buffaloes	52,003	900	2.8	0.2083	0.57	0.000474	5.08	0.0424	
Total requirements				4.5993		0.5764		3.4158	
Grand Total				55.4999		2.0344		18.6618	

by the bovine stock demands as high a quantity as 3.215 million tons of starch-equivalent and 0.627 million tons of digestible crude protein. Overall requirements for maintenance, production and growth work out to 55.4999 million tons of dry matter 2.03 million tons of digestible crude protein and 18.6618 million tons of starch-equivalent. Thus the ratio of digestible crude protein to starch-equivalent required is 1 : 9.17.

Nutrients available from the feeds:—Information with regard to the quantity of different cattle feeds was obtained from the Memoirs of the Madras Fodder and Grazing Committee, 1947. The nutrients available from them are calculated with the help of nutritive values contained in Misc. Bulletin No. 25 (1947). The item of natural grasses given in the tables includes the natural grasses from the Departmental reserves and other forests, beds and bunds of water sources, road margins and cultivated wastes. Since they include a variety of grasses and the proportion between each of them is not known, it is presumed that they possess the same nutritive value for purposes of calculation. Straws from Cholan, Kambu, Ragi, Korra, Varagu, Samai and Maize have been dealt under one heading of Millet straws. Since no figures for individual straw are available in published literature, the values for these Millet straws are computed on the basis of figures for Ragi straw. The term Legume straws referred to in the table includes vegetative residue from Horsegram, Green gram, Bengal gram and Black gram. The nutrients contained in them are calculated on the basis of figures available for Gram Bhusa. It is clear from Table II that both from roughages and concentrates, only about 24.55667 million tons of dry matter, 7.499 million tons of starch equivalent and 0.44117 million tons of digestible crude protein are available to animal population of this province. The available dry matter supply comes to about 1.08 tons per head per year. This works out to about 6.72 lbs of dry matter per day. Even if the average requirement is found to be 12 lbs on the over-all average body weight of 600 lbs. for young and old animals, the shortage is roughly about 50 per cent even for maintenance. It will readily be recognised that if the animal is producing milk or performing work, the requirements will be higher and shortage of foodstuff will be more acute. In the calculation of requirements for work production, it is presumed that the animals are doing medium work for only a period of 8 months in the year. If one compares these data of estimate of requirements and available nutrients, it becomes clear that this State is short of 30.9432 million tons of dry matter, 1.59 million tons of digestible crude protein and 11.0625 million tons of starch-equivalent. In terms of percentage, the deficit works out at 54%, 78.01% and 59.08% respectively of Dry Matter, Digestible Crude Protein and Starch Equivalent. Similarly, while the required ratio of Digestible crude protein to starch equivalent is about 1 : 9.17, the actual available ratio is something like 1 : 16.89. This clearly shows that the shortage is more in the case of Protein. Thus the gap between demand and supply is very wide. This is the picture presented when the calculations are made upon

the present production of 1.9 million tons of milk (Milk Marketing Report-1942). According to Aykroyd the requirements of milk of this Province at a minimum rate of 8 ounces per head is about 3.2 million tons. For this difference of 1.3 million tons of milk, the difference between the estimated requirements and present supply, about 0.33 million tons of starch equivalent and 0.054 million tons of digestible crude protein are required. If this is also added up to the original deficiency, the position becomes still worse.

It definitely gives rise to a doubt whether this province is so seriously short in cattle feeds. It is quite possible that the figures presented here may slightly be higher since the foreign standards are used for calculating the requirements of the animals. The requirements of Indian cattle particularly for energy may be lower when compared to foreign cattle since the animals in this country have to struggle hard to get rid of their heat from their body while the animals in cold countries fight against external cold. However, our standards also, if worked out, may not be so low as to mitigate the huge shortage as presented here. The fact, however, remains that we are far short of the requirements in cattle feeds.

TABLE II.
Nutrients available from the feeds.

Crops.	Yield per annum	D. C. P.		S. E.		D. M.	
		Percent.	Total in million tons.	Percent.	Total in million tons.	Percent.	Total in million tons.
<i>Million tons.</i>							
1. National grasses	7.9008	1.33	0.10508	6.25	0.4938	25	1.9732
2. Cultivated fodders.	2.7417	1.1	0.03026	8.6	0.23579	25	0.6854
3. Paddy straw	11.5536	—	—	22.0	2.542	90	10.398
4. Millet straws	10.257	0.2	0.0205	30.0	3.077	90	9.231
5. Legume straw.	0.600	2.17	0.0013	10.1	0.0066	90	0.540
6. Horse gram	0.205	11.2	0.0229	68.4	0.14029	90	0.1846
7. Husks and pulses.	0.1139	—	—	29.8	0.03394	90	0.1025
8. Rice bran.	0.9999	6.08	0.0599	52.0	0.5199	90	0.8999
9. Cotton seed	0.261	28.5	0.07439	74.2	0.19314	90	0.2349
10. Oil cakes.	0.338	38.34	0.12963	76.0	0.25696	90	0.3043
Total.			0.444112		7.49930		24.5566

In terms of feeds, the shortage is shown in Table III.

TABLE III.

Extra feeds required to make up the deficiency by providing proportion of digestible protein to starch equivalent.

Name.	Proportion.	Composition.		Required in million tons.
		S. E.	D. C. P.	
Green fodder	20	10	1.5	23.27
Straws	20	22	—	23.27
Cakes	2	76	38.34	2.33
Brans	3	53	10	3.49

If the cattle wealth of this province is to be restored, some of the steps outlined below have to be taken to provide the quantities of the foodstuffs mentioned in the table. At present, the land arable is distributed in the following way for different crops in this Province:

Cereals	...	22.29 million acres.
Pulses	...	2.935 do
Oil seeds	...	5.455 do
Cotton seed	...	1.376 do
Fodder crops	...	0.4635 do

In planning out methods to make up these deficiencies, the human requirements should receive primary consideration. By readjustment of the present cropping programme and proper planning of future crops, it appears possible to meet major part of the deficiencies in foods. It has been estimated that this province is short in cereals for human consumption to the tune of 10 to 15 per cent. It can reasonably be estimated that as a result of various measures under the consideration of Government, it would be possible to increase the yields by 30% from the present average in 10 to 15 years. If this target is achieved, it would be possible to meet 12 to 15% increase in about 20 million acres of land. This would automatically result in an increase of at least 10 to 12 million tons of straw and 1.5 million tons of brans. This measure at the same time releases about 2.29 million acres for other crops.

About 1.5 million acres of more land may be allotted to fodder crops from the current fallows. This land, along with the 0.46 million acres now under fodder crops, if sown with high-yielding grasses, would yield about 14.7 million tons of green fodder at 7.5 tons per acre. Further, at present, nearly about 3.6 lakhs of acres of land is under tobacco which is a short-term crop. Therefore, if it is possible to utilise the south-west monsoon for raising short-term fodder crops on this land, such as Chulam, it would result in supplying about 3.6 million tons of green chulam at the rate of 10 tons per acre, thus

reducing the deficit to 4.97 million tons. This small deficit in green grasses as well as straw could be made good by popularising hay and silage making.

The released land of 2.29 million acres could be profitably used for raising oil-seeds. This may result in reducing the deficit to about 35%. Thus a larger production of legume crops will not only increase the yield of ideal fodder but will enrich the soil also. The extra forages consumed by cattle will be returned to the soil in the form of manure. With the return of fertility, there will be no longer any necessity for the extensive systems of cultivation as practised now.

Thus meeting the greater part of the shortage by readjustment and better future planning of the crops, it would be possible to meet the greater part of the shortage. The rest of the deficit could be met by adopting these methods. The animal products such as blood, from 6 million sheep slaughtered annually in this province and the large quantities of the fish-meal which are not used to any considerable extent in feeding cattle, will go a long way in relieving the protein shortage. The large quantities of straw wasted in surplus pockets for want of transport facilities could be made available in areas of scarcity. Necessary changes should also be effected in the feeding practice of cattle to bring them on scientific lines. The oil cakes are at present mostly used as manure in the fields. They should be diverted to be passed through alimentary tracts of the animals on to the land. This serves the double purpose of feeding animals and land. Efforts should be made by conducting researches to explore the means of improving the digestibility of our staple fodder, the paddy straw. The new sources of fodder supply such as fodder leaves must be gone into to find out their potentialities. The practice of growing leguminous crops as a rotation crop in paddy fields should be encouraged to a large extent.

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REFERENCES

1. Memoirs of Fodder and Grazing Committee, 1947—Quantitative Survey of cattle foods in Madras Province.
2. Krishnaswamy, S. Y. 1947—Rural problems in India.
3. Season and Crop Reports of Madras Government (1944-45)
4. Sen, K. C.—Misc. Bulletin 25, 1948, Indian Council of Agricultural Research.

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No. 1

Editorial

FIGHT AGAINST TUBERCULOSIS

Quite a good force is being mobilised in the fight against Tuberculosis which is the second deadliest disease in India levying a toll of about 5 lakhs of people annually and incapacitating another 30 lakhs of population. Opening of more and more Sanatoria, starting of clinical centres and organisation of B.C.G. Vaccinations on a country-wide scale are measures which are being prominently kept before the public eye all the time. Attention is also being directed to the improvement of environmental factors. All these measures are good as far as they go and they certainly enable us to build up a good front. But, then, they will not contribute the entire front, nor will they be an effective front, unless a few other measures are also taken on hand simultaneously and with the same enthusiasm and vigour. Amongst these other measures are two which we desire to bring to the prominent notice of the public and also of those engaged in the organisation of the Anti-Tuberculosis Campaign. The first is that the disease Tuberculosis is one of the diseases which are communicable from animals to human beings. This is a point which is often ignored and treated lightly. It has been often taken for granted that, in a tropical country like India where animals are kept in conditions greatly different from other continental countries, this disease is rarely prevalent. But recent sample surveys, especially in some urban areas and milk production centres and slaughter houses, have revealed the fact that the incidence of the disease amongst animals in this country is not as

insignificant as it was supposed. It also revealed that, if no adequate steps are taken immediately to find out the exact position, it may assume even serious proportions. And, therefore, it is very essential that immediate steps are taken to organise and conduct Tuberculin-testing in dairy centres and urban areas to find out the extent of the possible danger to human beings from animals.

The second point on which we should like to lay very great stress is that Tuberculosis is essentially a deficiency disease. Mal-nourished and ill-nourished people contribute the fertile field for this disease and, therefore, the nutrition of the people of the country must be built up by the provision of more and more nutritious and nourishing *protective* foods. Among such foods, milk, eggs and meat stand foremost. The supply of these foods must be made adequate and cheap. It is here, unfortunately, that the country is lacking. These articles of vital nature are not only scarce in the land but also they are beyond the means of the ordinary people. Even in places where Sanatoria are established for the treatment of Tuberculous patients, these articles of diet are not easy to obtain. In fact, we have often wondered how such Sanatoria can be said to be properly equipped and administered unless an adequate provision is made for the easy availability of these essential *protective* foods, the need for which is far greater in actual sufferers than in others. This also is, therefore, a very urgent measure which those engaged in Anti-Tuberculosis Campaign should look into immediately.

Thus, it will be seen, that, in this fight against Tuberculosis, animal health and productivity play a considerable part. It is, therefore, imperative that, for the success of the Anti-Tuberculosis Campaign, the potentialities of the Veterinary profession in advancing the methods of prevention and cure of this dread malady are made full use of.

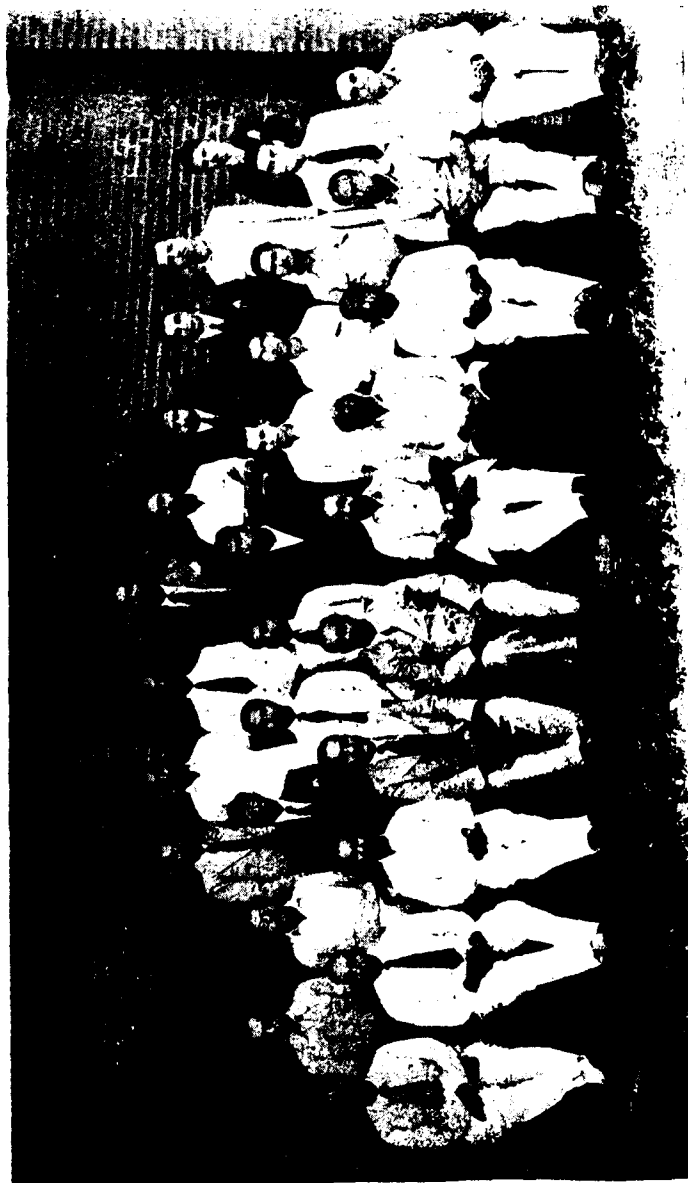


Dr. RAJA DODDANANJAYYA, B.Sc., B.V.Sc., Ph.D.,
Animal Husbandry Department, Mysore.



Dr. SYED MOHIYUDEEN, B.Sc., B.V.Sc., Ph.D.,
Animal Husbandry Department, Mysore.

INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR
ADVANCED COURSE IN POULTRY HUSBANDRY
1949-50



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Standing 1st Row :—Messrs. R. N. Srivastava, D. R. Ramani, M. Natarajan (Madras) S. C. Dutt, D. Parthasarathy, S. Narayana, D. P. Mookerjee, P. B. Menon, H. P. Tandon, D. B. Mookerjee.
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RETURNED FROM ABROAD

Among the deputationists who have recently returned from abroad are Dr. Syed Mohiyuddeen and Dr. Raja Doddananjayya, who went to U.S.A., as Mysore State Scholars for higher studies in Veterinary Science. Both of them have returned with a Degree of Doctor of Philosophy. We congratulate them on their distinctions.

Syed Mohiyuddeen is a native of Mysore City and took his Degree of Bachelor of Science (B.Sc.) in Chemistry and Biology in 1937 from the Mysore University. Selected in 1938 as a Mysore Government Scholar to study the 5 years' B.V.Sc. course of the Madras University, he joined the Madras Veterinary College and took his Degree of Bachelor of Veterinary Science from the University of Madras in 1943. He then joined the Mysore Government service as a Veterinary Inspector in the Department of Animal Husbandry. After eleven months' work in the field in connection with Rinderpest control, he was posted to the Mysore Serum Institute and acted in the capacity of a Lecturer at the Stockman's Training School, Bangalore, for more than two years until he left India for U.S.A., as a Mysore Government Scholar. In U.S.A., he specialised in the various aspects of Veterinary Pathology like Clinical Pathology, Oncology, Special Bovine and Poultry Pathology, Hematology, Chemical and Functional Pathology and Endocrinology at the Ohio State University, Columbus, Ohio, wherefrom he took his Ph.D.

The biological behaviour of some neoplasms of domestic animals formed the special problem of his research with the view to evaluate Heterologous, ocular transplantation as the clinico-pathological test for the essay of malignancy and degree of anatomy of tumours. This dissertation presented in partial fulfilment of the requirement for the degree of Doctor of Philosophy was considered by his Professors as one of the finest that had been presented in the Graduate School of the Ohio State University and the results of this original investigation will appear shortly in the American Journal of Veterinary Research.

Besides these curricular studies and research, he undertook educational tours to most of the Veterinary Colleges and Research Laboratories in U.S.A. and Canada, and also visited Institutes of human and animal pathology in America and England including the Royal Veterinary College.

Raja Doddananjayya is a native of Bangalore in Mysore State. He had his early education in Mysore and took the Degree of B.Sc. from the Mysore University in 1938. He then joined the Madras Veterinary College

as Mysore State Scholar and took the B.V.Sc., degree in 1943. Returning to his native State, he joined the State veterinary service and worked first in Rinderpest control and later on as a Lecturer of the Stockmen Training School. In 1947, he proceeded to U.S.A., on deputation by the Mysore State, for higher education in Bacteriology at the State College of Washington. During his stay there, he visited most of the Biological Institutions and underwent training in some of the well-known institutions of the U.S.A. He worked nearly a summer at the Rocky Mountain Laboratory and about two months at the Lederle Laboratories, Pearl River, New York, under the supervision of Dr. Herald R. Cox, the well-known Bacteriologist of the United States. His thesis on 'Q' fever obtained for him the Degree of Ph.D. in Bacteriology. While returning home, he visited some of the Veterinary Institutions in Great Britain and also the Pasteur Institute at Paris, France.

We understand that both the above mentioned officers have joined the Mysore Serum Institute. In wishing them a successful career, we hope they will have all the facilities for developing research work.

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Clinical Articles

ENCEPHALOMYELITIS (SPORADIC) AMONG ANIMALS IN AJMER

By

HARJAS RAI, MAHAJAN and SANKARNARAYANAN, N. S.

Animal Husbandry Department, Ajmer.

A disease affecting the nervous system, simulating specific Encephalomyelitis, has been fairly common during the winter months in Ajmer, among all species of animals including buffaloes, cows, calves, goats and horses. The disease did not seem to be a contagion as it was not wide-spread, only sporadic cases occurred, but they proved fatal all the same. Symptoms and post-mortem lesions were identical to those of Encephalomyelitis reported in the scanty literature available on hand. For want of facilities, no elaborate research on its aetiology was attempted and whatever work was carried out was confined to the method of successful chemotherapy and this record deals with a series of cases of this complaint and their successful treatment.

The first animals in the series were a cow and a horse admitted in the hospital suspected for rabies. Both these cases were showing identical symptoms of a nervous nature and were characterised by dullness, salivation and constipation. After a stage of paralysis and prostration, both the animals died. No post-mortem examination was conducted as they were suspected to be cases of rabies although there was no history of bite in their cases.

The next case was a milch goat. Although she was eating regularly, she showed signs of paralysis and inability to stand or walk. There was extreme constipation. A course of symptomatic treatment produced no effect. Suspecting the case to be one of tetany or ketosis, a course of treatment with calcium gluconate administered intravenously was resorted to, but with no effect. The animal died after five days. Unfortunately the carcass was not available for an autopsy as the owner removed it promptly.

Almost simultaneously with the above case, we had an occasion to attend on a buffalo belonging to a Gujjar. The buffalo had calved only the previous day and the calf was found to be healthy and well grown. The dam was, however, dull, off feed with a tendency to move towards one direction in circles. The owner had already treated her with hot iron making a deep circular mark at the back round the brow, thighs and both sides of the vertebral column; besides he had administered all available drugs recommended by local *vaid*s. Unfortunately, he thought of the nearby Veterinary Hospital giving free treatment only as a last resort. This animal was suspected of hypocalcaemia, and calcium gluconate injections were given intravenously; but the buffalo died

the next day. Again the carcase was not available for post-mortem as the owner never informed us of its death in time.

During the last week of November 1949, a heifer-calf of about a year old was admitted into the hospital with a history that the animal was suddenly taken ill, with symptoms of being off feed, inco-ordination of limbs, going round and round and falling down. After 14 days, the hind legs became completely paralysed and animal was brought to the hospital in a hand-cart. Rabies was negatived not only because there was no history of rabid bite, but also because it is seldom that animals survive a fortnight from the commencement of symptoms.

On observation, the calf showed a temperature of 101.4. The hind limbs were paralysed and failed to evince pain when pricked at the hind and back and the neck was stiff showing torticollis; the tail was, however, sensitive and playing about. Eyes congested, respiration and pulse were slow and imperceptible. The animal was completely off-feed and highly constipated, passing at times with great difficulty dark hard faeces in pellets like those of a goat. Symptomatic treatment with enema only aggravated the malady. Opacity of cornea supervened followed by general oedema. By way of treatment calcium gluconate injections were given but with no effect. The animal died a week after admission. This time, fortunately, the carcase was available for post-mortem. A thorough post-mortem examination was promptly conducted with the following results.

EXTERNAL APPEARANCES :—

Oedema of the neck; when cut, sero-sanguineous fluid having the appearance of muscle juice from a case of experimental pleuro-pneumonia escaped but the fluid failed to clot unlike the above juice.

INTERNAL APPEARANCES :—

Lungs :—Collapsed with stasis of blood in vessels.

Heart :—Full with blood and congested.

Liver :—Showed acute congestion perhaps due to venous stasis.

Spleen :—Thin, pale and flabby.

Kidneys :—Congested.

Abomasum :—Congested with dark decomposed food materials.

Duodenum :—Showed acute congestion.

Bladder :—Distended with normal urine about a litre.

Brain :—Acute congestion of the pia-mater with vessels engorged and adhesion to the brain tissue. Excess of cerebral fluid was noticed and it was blood stained. Haemorrhage was evident when cut.

Spinal cord :—Spinal fluid was almost blood; the cord proper was free and not adherent.

From the above lesions the case was suspected to be one of encephalomyelitis and suitable materials were sent to Indian Veterinary Research Institute, Izatnagar, for histopathological examination and transmission experiments. After a week, the Research Officer, Disease Investigation, Indian Veterinary Research Institute reported as follows :—“The brain sections revealed distinct features associated with Encephalomyelitis such as capillary congestion, focal haemorrhage neuronophagia and slight but distinct perivascular infiltration with lymphocytes. The other organs showed no appreciable abnormality. The small animals inoculated sub-durally and sub-cutaneously have not shown any evidence of disease after a week.” Since no further communication was received till now, it is presumed that the disease was not transmitted or transmissible.

The sixth case in the series was an old cow belonging to the local Gowshala. The condition was poor. When admitted, the animal was moving round and round in circles and knocking against objects as if totally blind. It had a tendency to go towards the heap of grass from which it picked up a few blades at times. Finding no effect from the treatment adopted in the previous cases, a new line of treatment was thought of. To begin with, this cow was given sub. cut. a formalysed 4% brain emulsion from the calf mentioned previously as a vaccine in doses of 2 c.c. each time for 2 days twice daily, followed by a sedative electuary and sulphaguanidine which was added to counteract septic meningitis if present; but the symptoms continued without abatement and the treatment produced no good. In the meantime, the report on the examination of calf material was received which clearly proved that these cases were of encephalomyelitis. The treatment was therefore changed.

Hexamine was given intravenously followed by an electuary containing soda salicylas and camphor. After two injections, the cow stopped going round and round and, after 2 more injections the animal completely recovered and was discharged cured.

This case was followed by two more buffaloes showing exactly identical symptoms and they were also cured by the intravenous administration of hexamine right away.

Symptoms, lesions, pathological changes and the successful treatment clearly prove that these were cases of encephalomyelitis, the etiology of which it was not possible to work out. In all such cases hexamine is worth the trial.

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CAESAREAN SECTION IN A COW*

BY

A. NARAYANAN, G.M.V.C.,
Veterinary Hospital, Srivilliputtur.

Subject:—A local bred cow, aged four years.

History:—On 31-12-47, it was brought for treatment with a history of having been in labour for four days without any result.

Symptoms:—On examination, the cow was found to be straining continuously. The vulval lips were swollen and oedematous. The vaginal mucous membrane was highly congested and began to bleed on slight handling. The calf was dead and decomposed and was found to be in posterior presentation in a lumbo-sacral position. The tail of the foetus was broken at its base and the 13th, 12th and 11th ribs on the left side of the calf were also found fractured. Evidently the cow had been handled very roughly.

The owner was informed of the grave prognosis of the case. With his consent, it was decided to deliver the calf by caesarean section.

Technique.—The right flank was shaved, washed and sterilised by applying Tr. Iodine. The cow was prepared by giving one ounce of Chloral Hydras with mucilage as drench and was cast and secured.

A twelve-inch incision was made from a point equi-distant from the external angle of ileum and the last rib, and carried forwards and downwards in the direction of the fibres of the internal abdominal oblique muscle. The incision was carried through the skin to the latter muscles which were carefully cut through until the peritoneum was reached. It was carefully incised and opened out to the extent of the external wound. The uterus was brought opposite to the incision and was opened out very carefully to avoid the uterine discharges from gaining entrance to the abdominal cavity. The cut edges of the uterus were sutured to the outer wound through muscle and skin. Wide sterilised towels were spread around the wound. The dead calf was removed with all the membranes.

The uterus was mopped with Lysol lotion, Sulphanilamide powder was dusted and smeared over the uterine wall and the wound was closed by Lambert's sutures with catgut. The edges of the wound on the abdomen were brought together by rows of interrupted sutures, one for the abdominal muscles with catgut and the other on the skin with silk ligature. Sulphanilamide powder was dusted on the skin and muscle sutures also.

*Paper read at the quarterly meeting of the Ramnad branch of the Madras Veterinary Assistant Surgeons' Service Association.

UMBILICAL HERNIA IN A BUFFALO CALF

53

Post-operative treatment.—The animal got up an hour after the operation. Later, a stimulant drench was administered. The animal was put on Sulphonamides for one week (5-1-48 to 12-1-48). Lugol's Iodine 20 c.c. was given intravenously 6 times at 3 days intervals.

On the 10th day, the external wound began to suppurate and the uterine discharge through the vagina was foetid. Some of the dependent sutures on the skin were therefore removed and dressed with Sulphanilamide and 01. Vitaminatum gauze (1 in 6). The uterus was douched with warm 1% lysol lotion and aspirated. Later, 3 ounces of Sulphanilamide in 01. Vitaminatum dressing was syringed into the uterus and the animal given gentle walking exercise. The dressing was continued till 23-1-48 when the animal was discharged cured.

It is really interesting to note that, when recoveries in large animals from Caesarean section are very rare, this operation was successful in spite of the advanced putrefaction of the foetus.

A photo of the animal after its discharge from the hospital is enclosed herewith.

UMBILICAL HERNIA IN A BUFFALO CALF

BY

D. VAIDYANATHAN, G.M.V.C.,
Veterinary Assistant Surgeon, Papanasam

Subject:—A local-bred buffalo heifer calf, 2 months old, was admitted for treatment on 30-3-1950, with a history of having a round swelling in the naval region.

Symptoms and diagnosis:—On examination, it was found to be a case of reducible umbilical hernia (Omphalocele), oval in shape, with a loop of intestines as the hernial contents. The size of the ring was $1\frac{1}{2}$ " x 1".

Treatment:—The calf was secured and the umbilical area was well cleaned with disinfectants. After reducing the hernia and keeping the loop of intestines well pushed beyond the ring, 2 c.c. of hypertonic saline solution was injected subcutaneously in the region all round the hernial ring.

A pressure bandage with a wad of wet cotton-wool was applied and the calf was put on milk and gruel diet.

The injection with 1 c.c. saline was continued for three consecutive days and the pressure bandage also was continued.

There was a slight inflammation in the region during the period when the injections were given and the animal evinced great pain when the region

was pressed. The pressure bandage was continued for 15 days more. The hernial ring was observed to be closing up gradually from the 8th day of commencement of the treatment, and closed up completely on the 16th day.

The calf was in normal health when seen a month later.

FREAK OF NATURE

By

G. B. RAICHUR, G.B.V.C.,

Veterinary Assistant Surgeon, Akkialur, Bombay

A cow aged five years was full term pregnant in her second calving. Signs of parturition were noticed and the calf appeared in breach presentation. There was very little progress in the delivery and the calf was pulled out after very great efforts by the local people.

On removal, the calf was found to have two heads carried on two necks which bifurcated from about the middle of a normal single neck, as will be evident from the enclosed photograph. The organs were apparently normal.

The cow, in spite of severe handling, is, fortunately, healthy and well.

CORMO-MELODIDYMI (MONOCEPHALIAN MONSTER) IN A PIG*

By

M. BALASUBRAMANIAN, G.M.V.C.,

Veterinary Assistant Surgeon, Virudhunagar, Madras

While attending on a case of dystokia in a sow, I found it to deliver a monster with the following description:—one head and two bodies, each body with 4 limbs. The bodies were joined at the shoulder region as is evident from the accompanying photograph. The specimen was examined by Sri D. Mariappa, G.M.V.C., Lecturer in Anatomy, Madras Veterinary College, who reports as follows:— "It is very creditable for the author to record these few lines on this rare specimen of a monster, which should arouse the curiosity of one and all in the profession. By its external anatomy, it is classified as "CORMO-MELODIDYMI (Mono-cephalian) Monster".

*Article received through Capt. G. A. Sastry, B.V.Sc., Secretary, Madras Veterinary Assistant Surgeon's Service Association.

MUMMIFIED FOETUS IN A GOAT

By

D. VAIDYANATHAN, G.M.V.C.,

Veterinary Assistant Surgeon, Papanasam.

Subject:—Local-bred, she-goat, aged three years, brought to the dispensary on 18-11-49.

History:—The goat which was pregnant was believed to have aborted about two months back while grazing in the fields. There was a slight vaginal discharge with pieces of placenta for about two days which subsequently stopped. For the past one month the goat was getting off-feed now and then with persistent diarrhoea. She was observed to be straining occasionally, followed by little quantities of whitish foetied discharge from the vagina. The goat was gradually losing condition.

Symptoms:—The animal was weak and emaciated. The temperature was 103.3, pulse and respiration normal. The animal was passing loose watery motions and urinating frequently, followed by straining with a little foul-smelling discharge from the vagina. When examined per rectum, the uterus appeared to contain hard, brittle and crepitating pieces. Vaginal examination revealed the presence of small pieces of skeletal bones in the uterus.

Treatment:—The vagina and uterus were douched with a solution of Potas permanganas and all the pieces of the skeletal bones of the dead foetus were removed. The bones were clean, devoid of all tissues and soft structures, which, obviously, should have become putrefied and come away as discharge. After douching, sulphanilamide powder half a dram in two ounces of shark liver oil was injected into the uterus. An astringent mixture was given and the animal put on gruel diet.

The mixture and uterine injections of shark liver oil and sulphanilamide were continued for two days and the animal was normal on the fourth day.

The goat was subsequently seen a month later and was quite normal.

Note:—The point of interest in this case is the retention of the putrifying foetus in the uterus for about two months without showing serious symptoms of metritis or toxæmia.

Association News

The Madras Veterinary Assistant Surgeons' Service Association

The Government have sent the following reply in answer to the Resolution No. 16 passed by the General Body of the Association in December 1949.

".....I am directed to state that the Government would be prepared to consider the grant of subsidy to persons who intimate their willingness to run private Veterinary Dispensaries on the merit of each case"

Such of those who are interested in this scheme are requested to communicate their desire to the secretary.

Madras, }
26th June 1950. }

G. A. SASTRY,
Secretary.

Proceedings of the Annual District Veterinary Conference Visakhapatnam for the year 1949-50 and the Resolutions passed by it

The annual District Veterinary conference for the year 1949-50 was held on 26-3-50 in the Central Hall of the Mahatma Gandhi Municipal High School, Visakhapatnam. All the Veterinary Assistant Surgeons in the District attended.

The following professional papers were read after the inaugural address by the District Veterinary Officer. It was a full dress session from 8-30 A.M. to 7 P.M. except for a short break at lunch and tea time.

1. Use of Indigenous Drugs in veterinary practice.—Sri T. Ramamohana Rao, G.M.V.C.
2. Homeopathy in Veterinary Science.—Sri B. L. Narayana Rao, Homeopathy practitioner.
3. Homeopathy in Veterinary Science.—Sri B. Sambamurty B.V.Sc.
4. Equine Surra in Visakhapatnam District.—Sri S. G. Venkatramayya, G.M.V.C.
5. Poultry Industry in Visakhapatnam district—Ways and means of immunising 25% of the poultry in the district every year against Ranikhet disease.—Sri B. Sambamurty, B.V.Sc.
6. Infertility in cattle.—Sri A. Rajarao, G.M.V.C.
7. Grass farming in Visakhapatnam District.—Sri Md. Yusuff, G.M.V.C.

8. Clinical Diagnosis of H. S. and B. Q. under field conditions.—Sri B. Mohanarao, G.M.V.C.

Resolutions

Resolved:—1. To place on its record its high appreciation of the splendid record of service rendered by Mr. T. J. Hurley, Director of Animal Husbandary, Madras, to the State of Madras and wishes to convey its best wishes to Mr. Hurley for a long span of peaceful and healthy life after his retirement.

2. To request all the Veterinary Assistant Surgeons in the district to use liberally and find out the utility of Indigenous drugs in Veterinary Practice and to record their findings in a separate professional note-book for the purpose.

3. To request all the Veterinary Assistant Surgeons in the district to widely try Homeopathic remedies in Veterinary Practice and record their observations in a separate professional note book.

4. That steps be taken to check the incidence of equine surra in certain areas in this district where the incidence is high, as an experimental measure.

5. That a nominal target of 3 lakhs of Ranikhet Vaccinations be fixed to be done by all the Veterinary Assistant Surgeons in one year so as to extend quickly the benefits of the vaccinations to as many ryots as possible and also to request the Director in pursuance of the above resolution to grant the following equipment. 6. Ice chests, 6-4 pints food jars, and 6 boston 5 c.c. syringes.

6. To institute an enquiry on a district-wide scale with the co-operation of all the Veterinary Assistant Surgeons in the district, to study the incidence of sterility among bovines, in this district, so as to find ways and means of checking its incidence.

7. That, in view of the abolition of the systematic touring, the new minor dispensaries be popularised and made a success so as to convert them into major dispensaries in course of time.

BIHAR VETERINARY ASSOCIATION

Summarised Proceedings of the Eleventh Annual General
Conference of the Bihar Veterinary Association held at Patna
in the premises of Bihar Veterinary College

From 16th to 19th May 1949

16th May 1949

The conference commenced at 5 P. M., after the reception of the chief guest, His Excellency the Governor of Bihar Shri M. S. Aney with other guests and a group photograph, when Dr. A. C. Chaudhury, B.Sc., Ph. D., Professor of Hygiene, Dietetics and Animal Husbandry of Bihar Veterinary College and Chairman of the Reception Committee of the Conference requested His Excellency with an emphatic welcoming speech to declare the conference open. In his address he appealed to improve the status and conditions of subordinate veterinary services particularly, in order to make it more lucrative, with suitable living salaries; even justice and proper recognition of individual talents; to efficiently staff the Bihar Veterinary College, which is now a degree college affiliated to the Patna University, to have suitable products of high calibre to man the varied nature of work pertaining to Veterinary and Animal Husbandry Departments. He further laid stress on the establishment of a Livestock Research Station to investigate into various problems connected with livestock improvement, particularly working out of cheap and efficient indigenous remedies. He demanded to increase the number of Veterinary Hospitals and Dispensaries in the province.

Thereafter, His Excellency, inaugurating the conference, remarked, "Unless we had good cattle, we shall not be able to achieve any tangible result in the matter of increased food-production and adequate milk-supply." His Excellency continued, "Our livestock must not only multiply, but must be of the highest quality and Veterinary and Animal Husbandry Departments had a very great responsibility to shoulder." In his concluding remarks he appealed to one and all to approach the high ideal of our ancient illustrious kings who devoted themselves heart and soul for the good and good alone of their country and the people.

Mr. S. K. Sen, B.Sc., M.R.C.V.S., Director of Animal Husbandry, Bihar, in his presidential address, laid special stress on the increased responsibility which had developed on them for augmenting the tempo of agriculture and food production in new free India. He emphasised that the modern Veterinarian had a very great obligation to discharge in the maintenance of human health and nutrition. He further laid stress on research side of Veterinary and Animal Husbandry Science and held that no deve-

lopment in any direction was possible without it, as results of researches and investigations carried out in Europe and America could not be accepted for application in India without verification and test. In his closing remarks he wanted better and uniform scales of pay for the members of the profession all over India for the sake of standardisation and efficiency and demanded prospects in the service, which unlike other services, was a specialised one and members have to look for their future within their own departments.

This day's sitting terminated at 7 P.M. with tea to the guests and a round to the Exhibition specially installed with a view to impart latest informations on various Veterinary and Animal Husbandry developments.

17th May 1949

The following resolutions were discussed and finally adopted by a majority of votes. Shri H. K. Roy, G.B.V.C., was in chair.
Subject matters of Resolutions :—

1. Condolence for Messrs. J. N. Bose, A. U. Ahmad, Md. Kafil and G. N. Roy Choudhury.
2. To move Government to provide free anti-rabic treatment to animals.
3. To move Government to address the Veterinary Assistant Surgeons in all official correspondence with the pre-fix "Dr." before their names.
4. To move Government to request local bodies to provide type plan buildings for Veterinary institutions.
5. To move Government to prescribe and sanction the scale of Rs. 175—400 for the non-practicing Veterinary Assistant Surgeons, as already done in the case of non-practicing sub-Assistant Surgeons of Medical Department.
6. To move Government to revise the scale of Veterinary Assistant Surgeons from Rs. 100-5-130 E. B. —6—190 to Rs. 125—8—305 E.B.—9 250.
7. To move Government to provide quarters for the office and residence of Veterinary Inspectors stationed in districts.

18th May 1949

In the morning some professional papers were read and discussed and in the afternoon the Secretary presented his annual report covering the period of calendar year 1948, which showed a closing balance of Rs. 1048/7/- (this figure does not include the routine expenses incurred

from 1st January to 18th May, 1949 and the expenses of this annual general meeting. Thereafter election of office-bearers and members of the Executive Committee for the new year took place and the following were duly elected to various posts :—

Mr. S. P. Ahmad	...	<i>President</i>
„ P.B. Kuppaswamy	...	<i>Vice-President</i>
„ G. Prasad	...	<i>General Secretary</i>
„ H. Prasad	...	<i>Joint Secretary</i>
„ B. N. Sinha	...	<i>Treasurer</i>
„ Q. Khan	}	<i>Members</i>
„ B. M. Prasad		
„ A.K. Varma		
„ J. K. Singh		

This day's business closed with a vote of thanks to the President and other guests who had taken so much trouble to come traversing long distances to make the conference a success, in spite of their engagements and occupations. The Principal of Bihar Veterinary College was also thanked for extending all co-operation and facilities in holding the conference there and accomodating the delegates.

19th May 1949

This day was utilised for going round the Exhibition, for demonstration and discourses on various exhibits of professional interest. A practical demonstration of Artificial Insemination was also held.

A. K. VARMA
General Secretary,
Bihar Veterinary Association

SIND VETERINARY MEDICAL ASSOCIATION

A meeting of Veterinary Surgeons of Sind Province was held under the Chairmanship of Mr. M. MOHEY DEEN, M.R.C.V.S. at Hyderabad, Sind and the following office-bearers of the Sind Veterinary Medical Association were elected :—

Mr. M. Mohey Deen, M.R.C.V.S.	...	<i>President</i>
Mr. Abdulmajid Siddiqi, S.V.S. Rtd.	...	<i>Vice-President</i>
Lt. M. A. Siddiqi	...	<i>Secretary</i>

M. A. SIDDIQI
Secretary.

College News

MADRAS VETERINARY COLLEGE

The following candidates have passed the Final Examination of the Veterinary and Livestock Inspectors' Course held in June 1950 at the Madras Veterinary College :—

- | | |
|---------------------------------|-------------------------------|
| 1. Ananta Padmanabha Rao, K. V. | 21. Viswanathan, Y. |
| 2. Ranganayakalu, V. | 22. Dakshinamurthi, N. |
| 3. } Mallikarjuna Rao, P. | 23. Thirumal Rao, T. |
| } Thyagarajan, S. | 24. Suryanarayana Rao, G. |
| 5. Srinivasan, S. (Tanjore) | 25. } Ganapathi, B. S. K. |
| 6. Rajagopalan, P. | } Kalyanasundaram, M. |
| 7. Rama Rao, P. | 27. } Edward Jesudasan, J. |
| 8. Raphael, E. I. | } Srinivasan, S. (Chingleput) |
| 9. Akbar Hussain Sheriff. | 29. Raja Rao, T. K. |
| 10. Ramakrishna Nair, C. | 30. Ramaswamy, M. S. |
| 11. Parthasarathi, V. C. | 31. Ragupathi Rao, G. |
| 12. Subba Raju, K. | 32. Balasubramanian, V. |
| 13. Sugirdaraj, P. A. | 33. } Bhaskaradas, M. |
| 14. Venkatasubba Rao, V. | } Pampanna Gowd, B. K. |
| 15. } Chandrasekhara Rao, K., | 35. Chandramouli, K. |
| } Raja Rao, P. | 36. } Muthuswamy, K. |
| 17. Somi Reddi, P. | } Srinivasan, N. |
| 18. Karitatta Reddi. | 38. Kalimuthu, K. |
| 19. Chidambaranathan, C. K. | 39. Appadurai, L. |
| Sankara Rao, P. | 40. Samuel Jesudasan, M. |

Madras }
2nd July 1950 }

DR. I. M. AZIZUDDIN, B.A., G.M.V.C. B.V.Sc., Ph.D. (Edin).
Principal.

News

INDIGENOUS DRUG PRESCRIPTIONS

Indian Council of Agricultural Research has sanctioned the appointment of a Special Officer for collecting and collating all available information regarding the indigenous drugs employed in veterinary medicine, from old Sanskrit manuscript and printed literature in view of the popular demand. This Special Officer has been appointed in South India who has taken the work in hand.

In addition another scheme has been introduced with the possibilities of finding out indigenous drugs not from the old Sanskrit literature, but from other available sources, as is well known that a number of effective

and cheap drugs and prescriptions are extensively used by local animal-owners, but they are not to be found in any records or book as this information to them is handed down from father to son.

The Indian Council of Agricultural Research has created a post for the later purpose as well and has recently appointed me to obtain the required information.

These indigenous practitioners are distributed throughout the length and breadth of the country. It is therefore difficult to have a direct approach to each and every individual, and to draw out anything from them in the absence of any previous familiarity.

I therefore, make an appeal to all my pupils, colleagues and professional brothers to draw out the required information and they may communicate it to me direct for consideration of such prescriptions and their subsequent trial.

If in any case my presence there is considered necessary, I would be glad to meet these parties for this benevolent cause.

It is further requested that if such prescriptions have been obtained, the name weight and dose of the ingredients may please be mentioned in Hindustani or in English or Latin Synonyms, as found in Glossary of drugs.

A copy of questionnaire is also enclosed giving an idea, to obtain the complete information.

SARDAR MOOL SINGH, P.V.S. (Class I),
(Retired Professor of Pharmacology, Punjab Veterinary College, Lahore)
Special Officer Indigenous Drugs (Veterinary) Indian Council of
Agricultural Research, New Delhi.

Questionnaire to be put to the Practitioners, very Tactfully and Politely

1. Name of the Practitioner?
2. His father's name and address?
3. Whether his profession is hereditary or has been started by him?
4. If self acquired, the authority from whom he learnt this branch of treatment?
5. Had he added anything from his personal experience?
6. Has he got a book or a manuscript on this subject? If so, in which language?
7. Whether he can be persuaded for humane purposes, the book or manuscript or a note book for perusal. Can he be further persuaded to hand it over its copy to the Government?
8. Has he specialised in the treatment of any disease or diseases? If so, the name of such diseases with particular treatment of that?
9. In case of really successful treatment would he be able to give an approximate number of such cases treated successfully and number of cases not treated successfully?

10. Does general public support or corroborate his statement?
11. Whether he can give any useful information regarding the treatment of disease so far not tried by him?
12. Whether he can give the name of the drug or of the plant with its identifiable points or description and detail of their uses?
13. Any other information which he can give.
14. Can he name any person or a retailer dealing in such stock preparations of the drugs with his specialities?

Special Officer Indigenous Drugs,
(Veterinary),

Indian Council of Agricultural Research, New Delhi.

Note:—The Veterinarians may please be asked to write the prescriptions and their ingredients etc. in a very calligraphic hand and even in Roman character (with Hindustani Synonyms) to avoid ambiguity in reading and transcribing.

Correspondence

Nasal Schistosomiasis . 'Treatment with Tartar Emetic'

Sir,

In the issue of our esteemed *Indian Veterinary Journal* Vol. XXV of May 1949, I read a clinical article written by Shri M. R. Sen, who has dealt with the disease—Nasal Granuloma and its treatment with Tartar Emetic in detail. This article prompts me to write something of my experiences on the subject.

In the year 1948-49 about 500 cattle were treated by me for the disease clinically diagnosed as Nasal Granuloma with Tartar Emetic. The weight of the animals was less than 500 lbs.

Method of treatment:—4 per cent solution of Tartar Emetic in distilled water was prepared with sterile precautions. Normal Saline solution was also kept ready in another flask. Two 30 c.c. and 20 c.c. record syringes well sterilised were kept ready for injections.

Technique:—10 c.c. of Normal Saline solution was first injected intravenously; immediately after 10 c.c. of Tartar Emetic, 4 per cent solution, was injected by the same route; this was followed by another 10 c.c. Normal Saline injection. In this way six injections were given and they were sufficient to cure the disease. The doses were increased slowly first dose 10 c.c., second dose 15 c.c., third dose 20 c.c., fourth dose 25 c.c., fifth dose 25 c.c., and sixth dose 30 c.c. of the four per cent solution. Normal Saline 10 c.c. was given before and after all the injections. Injections were repeated at intervals of four days.

The results were very satisfactory without involving any acute post-infection complication, either local or general. All my cases were completely cured and I received no complaint of re-infection by any owner.

R. N. KUNWAR, G.V.Sc.,
Veterinary Assistant Surgeon, Ghosi, U. P.

Canine Microfilariasis

Sir,

In March 1950 issue of the *Indian Veterinary Journal*, Dr. D'Souza in his note on "Canine Microfilariasis", page 415, has desired to be further enlightened on the subject. As the references cited by him appear only of text-books—I have taken the liberty to refer him to some actual case reports—appeared periodically in different journals in India and abroad.

- (i) "Cutaneous Filariasis" By S. N. Mitter, G. Beng, v.c., *Journal of Tropical Veterinary Science*; Vol. V; Part III; 1910
- (ii) "Filaria Immitis in Calcutta" By H. C. Gangulee, G.B.V.C. *Veterinary Record*, London; Sept. 28, 1912
- (iii) "La Filaire Cruelle a Calcutta" par H. C. Gangulee *Revue Veterinaire*; *Revue Veterinaire*; Paris; Nov. 1912
- (iv) "Canine Filariasis" By S. N. Mitter, & H. C. Gangulee *Veterinary Journal*; London, January 1915
- (v) "Filariasis in Dogs" By P. Panda, G. Beng, V. C., *Indian Veterinary Journal*; Vol. VIII; (No. 4) April, 1932

Mukteswar - Kumaon; U. P. }
28th April 1950

P. C. GANGULEE,
Indian Veterinary Research Institute.

Abstracts

An Effective and Economical Method of Curative Treatment of Equine Surra. Nat. & Appl. Sci. Bull. DE JESUS, Z., Cabrera, D. J., & Gonzales, F. Z. (1949). 9: 253-272. 1 table. (23 refs.)

An effective and economical method of curative treatment of surra in horses was developed. It consisted of intravenous injections of only one full therapeutic dose of naganol ("Bayer 205") at the rate of 1 gram per 200 lb. body weight in 10 per cent aqueous solution for the initial treatment and followed a week later by a series of half doses of tartar emetic (0.5 gram per 400 lb. body wt.) in 2 per cent solution in normal saline at intervals of 3 to 4 days for a period from 3-1/2 to 6 weeks. The complete treatment covered a period ranging from 4-1/2 to 7 weeks. Three cases of natural surra infection and two cases of experimental infection, involving 1

Philippine pony, 2 grade Arabian and 2 Mongolian horses, were completely cured with no relapse even in those cases harboring *Strongylus* spp., the common blood-sucking worms of horses. In this method of treatment, it appears that naganol simply serves to sensitize the *Trypanosoma evansi* to phagocytosis and possibly also serves to make the parasites more permeable to tartar emetic which is quite uniformly maintained at a low level of trypanocidal strength in the blood, thus precluding the attendant toxic effects of these two drugs on the hosts frequently observed heretofore in other methods.—Z. de Jesus.

* * * * *
Effect on the Embryo of Staleness of the Sperm at the Time of Fertilization in the Domestic Hen. M. Dharmarajan, Zoology Department, University Liverpool 3, Nov. 4. [Received through the courtesy of the British Information Services, Madras.]

It is a well-known fact that the domestic hen is capable of yielding fertile eggs for a considerable period after mating and isolation. Interest has centred around the incidence of fertility after different periods of isolation and the viability of the embryos obtained. A high incidence of mortality during the early stages of development has been recorded; but little or no attention has been given to the cause of this mortality.

Experiments have been in hand during the past three years, in the University of Liverpool, to discover, if possible, what the effect on the embryo might be of the 'staling' of the sperm within the genital tract of the female. A detailed study, involving flock and stud matings of hens incubating all the eggs laid over a period of four weeks after isolation, and serially sectioning more than 200 embryos of the 48- and 72-hr. stages, has shown that: (1) the eggs laid during the period of isolation tend to give abnormal embryos; (2) in the later days of isolation, just before the cessation of fertility, only abnormal embryos are produced; (3) the abnormalities are of a consistent type characteristically affecting the nervous system, and the vascular system, accompanied by a general retardation of development; (4) the head end of the embryo is mainly involved, and next in frequency the tail end, the middle length being relatively normal; and (5) the nature and site of the abnormalities approximate remarkably closely to those obtained artificially by other workers by the injection of toxic substances into the fertile egg prior to incubation.

Aberrations of the nervous system manifested themselves as irregular swellings of the wall of the brain and spinal cord, erratic foldings of the brain and overgrowth of the neural folds and their faulty union, resulting in the formation of a plug of neural tissue projecting into the neural cavity. Quite frequently the neural folds failed altogether to unite to form a tube. Abnormal vascular systems were exemplified by hypertrophy of the embryonic blood vessels and heart, over-vascularization of the vascular

membrane and hæmorrhage into the extra embryonic body cavity. In general, only the ectodermal and mesodermal derivatives were affected, the endoderm being quite free from irregularities.

The results obtained have been so consistent as to afford strong grounds for the view that a sperm, by its sojourn in the genital tract of the female before fertilization, becomes toxic to the zygote and tends to cause abnormal development of the resulting embryo. This work is being continued, and a detailed paper is being prepared on the results already obtained.

* * * *

Clinical Observations on Thiobarbiturate Anaesthesia in sheep.—

By D. A. Titchen, B.V.Sc., J. D. Steel, B.V.Sc., and F. J. Hamilton.
Australian Veterinary Journal, Vol. 25, No. 11, Novr. 1949.

"Sodium Pentothal" and "Sodium Kemithal" are satisfactory intravenous anaesthetics for the sheep. Of the two drugs, "Sodium Kemithal" is preferred because its action is shorter and there is less respiratory depression.

2. Anaesthesia with these drugs is induced rapidly, smoothly and quickly. It is easily controlled from moment to moment and recovery is fairly rapid and very quiet.

3. The drugs must be administered according to effect. A standard dose rate is not available, nor desirable.

4. Picrotoxin appears to be the specific antagonist to these drugs. The respiratory centre stimulants, "Metrazol" and carbon dioxide, are also effective as antidotes. Nikethamide is not effective in countering thiobarbiturate depression in the sheep.

* * * *

The failure of Benzene Hexachloride to control itch mite (*Psorergates ovis*).—By Marion T. Scott, B.Sc. *Australian Veterinary Journal*, Vol. 25, No. 12, Decr. 1949.

B. H. C. as a suspension with and without wetting agents, or as phenolic emulsion, or as an oil emulsion, at concentrations ranging from 0.007 to 0.056 gamma isomer, failed to eradicate *Psorergates ovis* infestations in sheep. At the highest concentration, only a few nymphs remained, but the infestations soon regained their pre-treatment levels.

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An Experiment to determine the relative growth and productivity of rams and wethers under identical field conditions.—By J. H. Riches, Ph. D., B.Sc., Ag., and I. L. Johnstone, B.V.Sc. *Australian Veterinary Journal*, Vol. 25, No. 11, Novr. 1949.

The results obtained in this experiment show that under identical environmental and feed conditions, rams attain considerably greater body

weights than wethers and cut heavier fleeces of greasy wool. The difference in fleece weight, approximately 12.4 per cent is less than is usually observed between rams and wethers, indicating that the early selection and better feeding of rams in general practice almost certainly have a considerable effect.

Body weights and wool cuts recorded in this experiment from both rams and wethers would undoubtedly have been greater had the seasonal conditions been more favourable.

The figures for the two groups of wethers indicate that, under the conditions of the experiment, the time of castration, up to an age of approximately four months, had no influence on subsequent body weight or wool production. Further, comparison of the body weight curves suggests that this would probably have been true up to at least five months of age. It is possible, however, that better seasonal conditions would affect this. Horn growth, on the other hand, although not excessive, was appreciably greater in the wethers, castrated at four months than in those castrated at five weeks.

* * * *

The Effects of Induced Hyper-and Hypo-Thyroidism on the response to a constant dose of pregnant mare's serum in immature male rats and mice.—By Joseph Meites and B. Chandraseker. *Endocrinology*, Vol. 44, No. 4, April 1949.

The effects of experimentally induced hyper-or hypothyroidism on the response to a constant dose of pregnant mare's serum ("Gonadogen") were determined in immature male rats and mice. Hypothyroidism was produced by feeding 0.1 per cent thiouracil for four to twenty day periods and hyperthyroidism was produced by feeding thyroprotein in concentrations of 0.02 to 0.64 per cent for ten day periods. The increase in the combined weight of the seminal vesicles and coagulating glands was used to measure the response to the pregnant mare's serum.

Thiouracil or thyroprotein, when fed alone, had no effect on the weight of the seminal vesicles and coagulating glands. When pregnant mare's serum was injected, the response of the seminal vesicles and coagulating glands was partially to completely inhibited by all except the lowest levels of thyroprotein in the rat, while in the mouse all except the highest concentrations of thyroprotein increased the gonadotrophic response by 72 to 140 per cent. Thiouracil, particularly when fed for the longer periods, increased the gonadotrophic response in rats by as much as 300 per cent, while the response in mice was reduced by 40 to 73 per cent.

It is concluded that, in so far as the response to pregnant mare's serum is concerned, immature male rats are secreting more than an optimal

amount of thyroid hormone whereas immature mice are secreting less than an optimal amount of thyroid hormone. A discussion of these and related data by other investigators leads to the conclusion that there is a distinct species thyroid difference between the rat and mouse which accounts for their opposite reactions to a number of similar stimuli.

ERRATA

Vol. XXVI, No. 6 (May 1950).

"Food Fishes of Bombay, their sources of supply, marketing and their mode of infection as to wholesomeness, etc." by DR. D. S. LAUD, G.B.V.Sc., F.R.H.S., F.Z.S.

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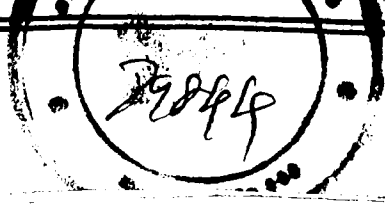
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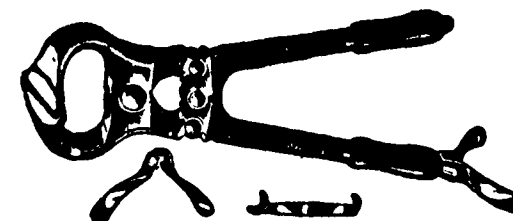
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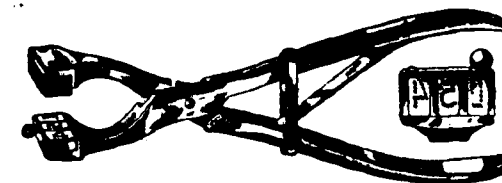
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