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NOVEMBER, 1961

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(The Journal of the Indian Veterinary Association)

A Monthly Record of



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Vol. 38

November, 1961

No. 11

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

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A Monthly Record of Veterinary Science
Devoted to the cause of the
Veterinary Profession



EDITOR

Rao Sahib T. VINAYAKA MUDALIAR, G.M.V.C.,
Office:—7, First Street, Vidyodaya East, T'Nagar,
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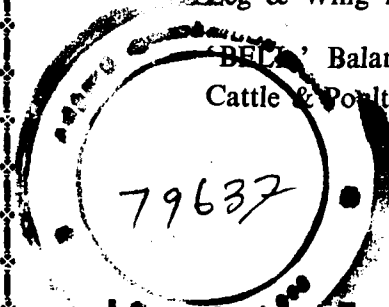
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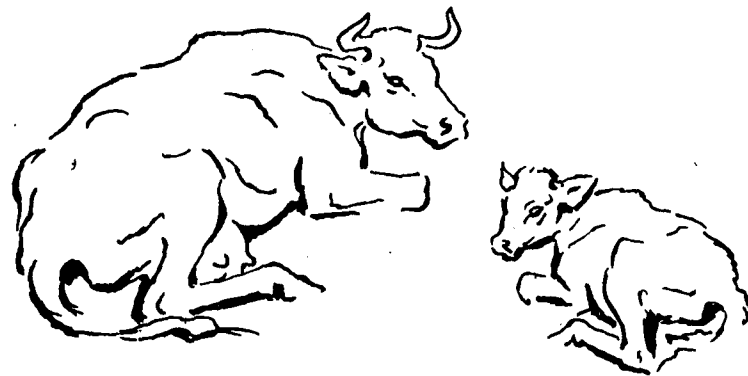
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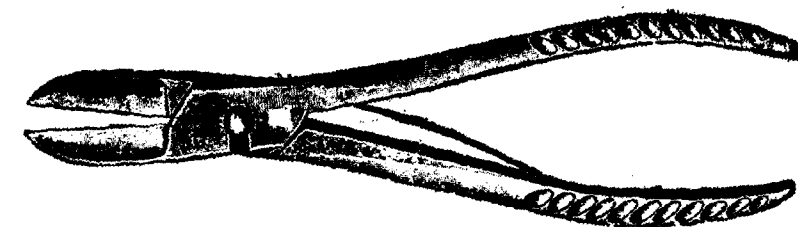
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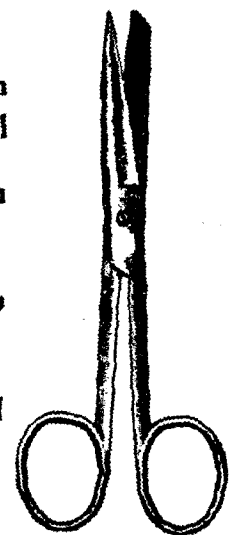


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Editorial

THE DIFFICULT ROLE OF THE I. V. J.

We are painfully aware of the "high-brow" nature of the articles appearing in the *I. V. J.*, in recent years. We admit to a growing sense of uneasiness of failing in our duty towards our practitioners and field-workers. Even so far back as September 1956, we drew the attention of our readers to this tendency, which the *I. V. J.* was being forced to assume, in spite of our best efforts to keep it within limits. A similar complaint was made against the *Veterinary Record* just about that time by Major Hamilton Kirk. He said "This publication has in recent times become—might I say—very "high-brow", devoting what I think to be far too much space to highly involved and technical articles with, almost invariably, pages of tables in each issue. Such articles are written and read, by experts in some particular sphere, and I am bound to say, are often of little interest to a busy general practitioner".

We indicated three definite reasons for this one-sided development of scientific journals of the present day. The first is the spate of Research articles that had started flowing from the Laboratories, Research Institutions, Field Investigation Centres, Health Units etc. The second one is the paucity of articles from clinicians and field-workers, in spite of repeated requests. The third reason is that there are not enough number of Journals in our country, more particularly of a specialised nature, to give publicity to all such research papers. We expressed as our considered opinion that there should be 'a balanced fare' in a professional journal to meet the requirements of all strata of our great community. But that remains a pious wish even to this day.

As would be seen from time to time, we even try to accommodate some articles that are not of the required standard in the hope that they might be of some use to the general practitioners. But there is a limit to which such accommodation can go. We admit with the skeletal staff we are working with, it becomes impossible for us to revise, to re-write, to recast and edit the several articles that are received by us. Even so, we do our best. The faults that creep in are mainly due to lack of proper and sufficient staff. The day is not far off when we hope to rectify these defects. But the co-operation of the profession is very vital to bring about these improvements. Unless and until such co-operation is forthcoming in unstinted measure, we fear we can do very little in the matter and the profession will not be justified in criticising us.

As a first step we once again appeal to the clinicians and field-workers to send us their case reports, their observations and their trials and tribulations to make the *I. V. J.* more interesting to the average reader. The management has been busy drafting rules and regulations for the institution of a medal annually to the best clinical article that would appear from 1962. Our colleagues in teaching institutions who handle so much of clinical material owe a duty to the profession to get some of the cases at least recorded in the *I. V. J.* Here is an opportunity for one and all to compete for the *I. V. J.* medal which will be issued in the name of that great clinician late Rao Bahadur R. Swaminatha Iyer, a former Principal of the Madras Veterinary College.

The next step we look forward to from our profession is the housing of this *Journal* in an abode of its own *with all necessary facilities in men and materials*. It is with that idea in view we have been trying to build up a Reserve Fund. But the response to it has been so far very discouraging. We salute all those few colleagues who have helped us to build up the Reserve Fund to the present extent at least. We have to particularly make mention of our allied co-workers *viz.* Messrs. Imperial Chemical Industries (India) Private, Ltd., and Messrs. May & Baker (India) Private, Ltd., for their voluntary contributions, thus setting an example to the members of our profession. We have endless ideas to bring about very many improvements in the *Journal*. But how are we to do it without the necessary facilities? Individual Officers should realise his or her duty to the profession and face this problem of placing the

I. V. J. on a sound and substantial basis. The voice of the profession will be hushed, if the *I. V. J.* ceases to exist. Let this be realised in time and not bemoaned later. So we appeal once again to every one in the profession to send us his or her contribution to the Reserve Fund immediately. Nothing will be wanting on our part to realise this ambition of housing the *I. V. J.* in a building of its own before the end of 1962, *provided the profession helps us*. Let us go all out for a final effort to raise this monument. Will the profession respond? Let the future answer.

A third appeal we are making to the profession is to try and start an Indian Journal of Veterinary Research to be of help to our expanding community of Research workers. It will go a long way to relieve the pressure on the *I. V. J.* and also avoid delay in the publication of some valuable articles. A committee of experts can run such a journal. If no State comes forward to start such a Journal, the Indian Veterinary Association will plan for this ambitious programme with suitable personnel, after the *I. V. J.* is settled in an abode of its own.

We know we are pitching our ambition a little too high. But nothing is impossible if the profession wills it. Such is our robust faith in the future of our profession. Arise, awake and do your bit by the profession!

Hallo!

Have you read the editorial?

Won't you be proud to house this National Veterinary Journal in a building of its own? What have you done individually to help the Journal which had helped you in some form or other?

Delay not to send in your contribution to the Reserve Fund.

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Ten good reasons why you should support it

1. It is a legacy from the pioneers of our profession.
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5. It has a world-wide circulation and has earned a definite place amongst the scientific journals of the world. India's name is intertwined with it.
6. If you allow it to perish through lack of your support, you will only bring about a first rate calamity on the profession.
7. Many a profession suffers for lack of such a journal. Realise it in time and lend your support immediately.
8. It is a powerful weapon in the hands of the profession and none dare harm you as long as it lives.
9. You are what you are to-day because of your profession. It is your sacred duty to guard that profession through the *I.V.J.*
10. It is our mouth-piece. Don't silence it and make the profession dumb.

UNITED WE STAND, DIVIDED WE FALL!

A Reminder!

Please note the supply of the Journal will be stopped from January 1962, if you are in arrears even for one year. Please therefore pay up your arrears within this current year. It will go a long way to help us.

EDITOR, *I. V. J.*

General Articles

OBSERVATIONS ON THE SUSCEPTIBILITY OF ADULT BUFFALOES TO RINDERPEST

By

T. P. JOSHI and K. C. SINHA

*Biological Products Division, Indian Veterinary Research Institute
Izatnagar, U.P.*

Although systematic attempts at the control of rinderpest in the east have been initiated since 1928 by vaccination, using caprinised rinderpest virus vaccine (Edwards, 1927; 1928), significant success has been achieved in this field since the World War II with the use of freeze-dried caprinised virus (Daubney, 1953), Lapinised virus, (Nakamura *et al*, 1938) and Lapinised-avianised virus (Nakamura *et al*, 1953) in India.

In India, rinderpest eradication scheme was launched in 1954 and it is evident that the disease would be effectively controlled by the Third Five Year Plan period. The incidence of rinderpest has been significantly reduced and it is nonexistent in Madras, Kerala and over a large area covered under the plan. During the mass vaccination campaign period, it has been possible to assess the relative susceptibility of various types of bovines to rinderpest virus and this work attempts at presenting data on the susceptibility of buffaloes which is an important study.

Earlier, precise information with regard to the susceptibility of buffaloes to rinderpest was not available. The susceptibility of buffaloes to rinderpest especially in *Bubalus caffer*, *Bubalus nanus* and *Bubalus bubalus* in Africa, Belgian Congo, Sudan, Nigeria, India and Indo-China has been mentioned (Curasson, 1938). The buffaloes in Madras and Mysore were reported to be highly susceptible to rinderpest virus as evidenced from caprinised vaccine inoculations (Daubney, 1953), but these were later reported to be fairly resistant (Alton, 1953).

The Egyptian buffaloes were found to be highly resistant to the epizootic strain of rinderpest virus and suffer from latent infection and act as carriers, whereas the Burmese buffaloes are extremely susceptible, death rate being 85 per cent; Indian buffaloes were found to be in-between the Egyptian and Burmese buffaloes in so far their susceptibility is concerned (Edwards, 1949). Buffaloes in India were reported to be highly susceptible (Holmes, 1913) and the mortality among adult buffaloes was to the tune of 50 per cent as against 49.2 per cent in buffalo-calves (Krishnamurthi, 1945). Recent work on the comparative

susceptibility of hill cattle and buffalo-calves reveals that buffalo calves react to rinderpest virus in intensity comparable to hill cattle, although in the former the mortality rate is 51.7 per cent as compared to 80.6 per cent in hill cattle (Uppal, Sinha and Seetharaman, 1959). Systematic vaccination trials have revealed that the cross bred animals (cross between yaks and hill cattle) in Ladakh, Mithun cattle in North East Frontier Region, Korean and Japanese cattle are possibly the most susceptible bovines. Since buffaloes in India constitute a highly valuable milch stock contributing the major bulk of milk produced, it was considered useful to carry out this investigation and assess their susceptibility to rinderpest.

Materials and Methods

This work, in brevity can be grouped into three groups of analysis, viz.,

- Susceptibility of adult buffaloes to rinderpest resulting from experimental infection with rinderpest virus.
- Reaction in adult buffaloes following inoculation with rinderpest virus in conjunction with a small dose of anti-serum injected simultaneously.
- Blood changes.

Observations were carried out on plain male buffaloes of 4-6 years of age. The body weight ranged between 200-400 kilogrammes. They were procured from local sources for the production of anti-serum and were free from gross defects and deformities.

In the category (a) of the experiments, such of those buffaloes which were used as controls for the batches of buffaloes inoculated with rinderpest antiserum and virus to the production of rinderpest antiserum have been included. These buffaloes were injected subcutaneously with 1 ml. of 1:10 suspension of virulent bovine rinderpest virus. These animals were kept under observation which consisted of recording of body temperature twice daily (morning and evening) for a period of eighteen days following inoculation.

In series (b) the reaction of the buffaloes which had received a small dose of rinderpest antiserum, (6-7 ml. per 50 kilogrammes body-weight) with 1 ml. of 1:10 suspension of the virulent bovine rinderpest virus was observed. Observations were carried out which consisted of recording of all the syndromes following experimental infection for a period of eighteen days.

In addition to these observations, the changes in the blood following infection were also studied. Blood was collected from the jugular vein in 5 ml. volumes in neutral glass vials each containing 10.0 mg. of dry Potassium Oxalate.

Experimental

In this study, analysis have been made to study (a) the susceptibility of 28 adult male buffaloes which were injected subcutaneously with 1 ml. of 1:10 suspension of virulent rinderpest virus*, (b) the susceptibility of 200 adult buffaloes which have been dosed with 30-60 ml. of rinderpest antiserum in conjunction with virulent virus. Haematological studies were carried out on 10 buffaloes.

Observations include (1) morning and evening body temperature (2) condition of feeding (3) mouth lesions (4) gastro-intestinal complications and (5) mortality rate. Haematological studies include total white cells and erythrocytes and haemoglobin content.

Qualitative analysis on the susceptibility of these animals are set out in table I and II.

TABLE I
Susceptibility of buffaloes to experimental infection with rinderpest virus injected subcutaneously.

Sl. No.	Animal Number	Temperature			Mouth lesions	Inappetance	Digestive disturbance	Remarks
		Not above 103°F	Above 103°F	105°F and above				
1	152	—	—	+	—	FF	+D	Survived
2	107	—	—	+	—	OF	+D	"
3	68	—	+	—	—	FF	SF	"
4	18	—	—	+	—	OF	+D	"
5	87	—	+	—	—	OF	+D	"
6	674	—	+	—	—	OF	+D	"
7	695	+	—	—	—	—	—	Non-reactor
8	613	—	+	—	—	FF	SF	Died
9	628	+	—	—	—	FF	SF	Survived
10	810	+	—	—	—	FF	—	Non-reactor
11	832	+	—	—	—	OF	+D	Survived
12	784	+	—	—	—	OF	+D	Died
13	759	+	—	—	—	OF	+D	Died
14	725	+	—	—	—	OF	SF	Survived
15	701	+	—	—	—	OF	+D	Died
16	672	+	—	—	—	FF	SF	Died
17	642	—	+	—	—	FF	SF	Survived
18	590	+	—	—	—	FF	SF	Died
19	572	+	—	—	—	FF	—	Survived
20	551	+	—	—	—	FF	SF	"
21	510	—	—	+	—	OF	+D	"
22	492	—	+	—	—	OF	SF	Died
23	480	—	+	—	—	OF	+D	Survived
24	310	—	—	+	—	OF	++D	"
25	307	—	+	—	—	OF	++D	"
26	263	—	+	—	—	FF	++D	"
27	239	—	+	—	—	FF	++D	"
28	187	—	+	—	—	FF	D	"

FF = Fed fairly; OF = Off feed; SF = Soft faeces;
D = Diarrhoea (+ moderate; ++ severe).

*Virulent rinderpest spleen tissue virus was obtained from the Director, I.V.R.I., Mukteswar-Kumaon, U.P.

TABLE II

Nature of reaction in buffaloes following experimental infection with rinderpest virus in conjunction with small doses of antiserum (7-8 ml. per 40 Kilo, body weight)

Sl. No.	Animal Number	Temperature			Mouth lesions	Inappetance	Digestive disturbance	Remarks
		Not above 103°F	Above 103°F	105°F and above				
1	806	—	+	—	—	FF	+D	Survived
2	807	+	—	—	—	"	"	Died
3	808	—	+	—	—	"	"	"
4	811	+	—	—	—	"	"	Survived
5	812	+	—	—	—	"	"	Non-reactor
6	813	+	—	—	—	—	—	"
7	815	+	—	—	—	—	—	"
8	818	+	—	—	—	OF	+D	Died
9	821	+	—	—	—	FF	"	Survived
10	828	+	—	—	—	OF	"	Died
11	824	+	—	—	—	—	—	Non-reactor
12	836	+	—	—	—	OF	+D	Died
13	837	+	—	—	—	OF	"	"
14	809	+	—	—	—	—	—	Non-reactor
15	816	+	—	—	—	OF	+D	Died
16	817	+	—	—	—	—	—	Non-reactor
17	819	+	—	—	—	—	—	"
18	820	+	—	—	—	OF	+D	Survived
19	822	+	—	—	—	—	—	Non-reactor
20	825	+	—	—	—	—	—	"
21	826	+	—	—	—	FF	SF	Survived
22	827	+	—	—	—	OF	+D	Died
23	828	+	—	—	—	—	—	Non-reactor
24	829	+	—	—	—	—	—	"
25	830	+	—	—	—	FF	SF	Survived
26	831	+	—	—	—	FF	SF	"
27	834	+	—	—	—	OF	+D	Died
28	835	+	—	—	—	—	—	Non-reactor
29	838	+	—	—	—	OF	+D	Survived
30	839	+	—	—	—	OF	SF	"
31	840	+	—	—	—	—	—	Non-reactor
32	841	+	—	—	—	—	—	"
33	842	—	+	—	—	FF	SF	Survived
34	843	—	+	—	—	"	"	"
35	844	+	—	—	—	—	—	Non-reactor
36	845	—	+	—	—	FF	+D	Survived
37	846	+	—	—	—	—	—	Non-reactor
38	847	+	—	—	—	OF	+D	Survived
39	848	+	—	—	—	—	—	Non-reactor
40	849	+	—	—	—	FF	SF	Survived
41	850	+	—	—	—	—	—	"
42	852	+	—	—	—	"	+D	"
43	853	+	—	—	—	—	—	Non-reactor
44	854	+	—	—	—	—	—	"
45	855	+	—	—	—	FF	+D	Died
46	856	+	—	—	—	—	—	Non-reactor
47	857	—	—	+	—	OF	+D	Survived
48	858	+	—	—	—	—	—	Died
49	859	+	—	—	—	FF	SF	Survived
50	860	—	—	+	—	—	SF	"

TABLE II—(Continued)

Sl. No.	Animal Number	Temperature			Mouth lesions	Inappetance	Digestive disturbance	Remarks
		Not above 103°F	Above 103°F	105°F and				
51	861	+	—	—	—	—	—	Non-reactor
52	862	+	—	—	—	FF	SF	Survived
53	863	—	+	—	—	"	"	"
54	864	+	—	—	—	"	"	"
55	865	+	—	—	—	"	"	Non-reactor
56	866	+	—	—	—	—	—	"
57	867	+	—	—	—	FF	+D	Died
58	868	+	—	—	—	—	—	Non-reactor
59	869	—	+	—	—	FF	SF	Died
60	870	+	—	—	—	OF	+D	Survived
61	871	+	—	—	—	"	"	"
62	872	+	—	—	—	"	"	"
63	873	+	—	—	—	"	"	"
64	874	+	—	—	—	OF	"	"
65	875	+	—	—	—	"	SF	"
66	876	+	—	—	—	—	—	Non-reactor
67	877	+	—	—	—	FF	+D	Survived
68	878	+	—	—	—	—	—	Non-reactor
69	879	+	—	—	—	FF	+D	Survived
70	880	+	—	—	—	—	—	Non-reactor
71	881	+	—	—	—	—	—	"
72	882	+	—	—	—	—	—	"
73	883	+	—	—	—	OF	+D	Died
74	884	+	—	—	—	—	—	Survived
75	885	+	—	—	—	"	"	Non-reactor
76	888	+	—	—	—	—	—	"
77	889	+	—	—	—	—	—	"
78	890	—	+	—	—	OF	D+	Survived
79	891	—	+	—	—	FF	"	"
80	892	+	—	—	—	"	"	Died
81	893	+	—	—	—	—	—	Non-reactor
82	894	+	—	—	—	FF	SF	Survived
83	895	—	+	—	—	OF	+D	"
84	896	+	—	—	—	—	—	Non-reactor
85	897	+	—	—	—	—	—	"
86	898	+	—	—	—	FF	SF	Survived
87	900	—	+	—	—	"	"	"
88	901	+	—	—	—	—	—	Non-reactor
89	902	—	+	—	—	FF	+D	Survived
90	903	+	—	—	—	—	—	Non-reactor
91	904	—	+	—	—	FF	+D	Survived
92	905	+	—	—	—	—	SF	"
93	906	—	—	+	—	OF	+D	"
94	907	+	—	—	—	FF	SF	"
95	908	+	—	—	—	FF	SF	"
96	909	+	—	—	—	—	—	Non-reactor
97	910	+	—	—	—	—	SF	Survived
98	911	+	—	—	—	—	—	Non-reactor
99	912	+	—	—	—	—	SF	Survived
100	913	—	—	+	—	OF	+D	"

Quantitative analysis of the susceptibility pattern of adult buffaloes in both these groups have been shown in Table III.

TABLE III
Susceptibility of adult buffaloes to rinderpest

Sl. No.	Group	No.	Thermal reaction (%)			Digestive disturbance (%)	Mortality (%)
			Not above 103°F	Above 103°F	105°F and above		
1	Virus alone	28	42.8	39.4	17.8	89.2	25.0
2	Serum-virus simultaneously	100	83.0	13.0	4.0	61.0	15.0

In order to estimate quantitatively the susceptibility pattern of serum-virus treated animals, their post inoculation response was further analysed using Haddow's method of assessment of reaction described earlier (Uppal, Sinha and Seetharaman, 1959). Particulars are set out in Table IV.

TABLE IV
Response in buffaloes after serum virus inoculation

Number of buffaloes included for analysis	Type of syndromes as signified by marks				Reaction	Animals exhibiting symptoms in category.	
	Temperature	Inappetance	Digestive disturbance	Type of syndromes		Below 50% level	Above 50% level
100	13.9	7.8	16.6	7.0	45.3	72	28

Haematological studies on ten randomly selected buffaloes of the sero-virus treated group were carried out and the particulars are given in Table V.

Discussion

It has been stated earlier that buffaloes in Egypt, India and Burma have been found to possess varying degree of resistance to rinderpest virus. In Egypt it has been reported that mortality among buffaloes is to the tune of 20 percent whereas in Burma it is about 85 percent (Edwards, 1949). In India, this has been estimated at 50 percent by the earlier workers (Krishnamurti, 1945). From tables I-IV, it will be seen that the incidence of mortality among adult buffaloes was about 25 percent and this would be substantially reduced (by about 60 percent) with the use of a small dose of antiserum. Among the syndromes which characterised experimentally induced infection, the thermal reaction was not well marked, no mouth lesions were seen, but it will be apparent that the incidence of digestive disturbance was of a very high order. Although, apparently, adult buffaloes did not exhibit

TABLE V
Haematological changes in response to rinderpest.

Sl. Animal No.	Reaction	Haematological study (Category)	Days														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	NR	RBC (mill/c.mm.)	6.03	7.00	7.20	6.50	6.20	6.00	6.30	5.00	5.10	4.20	5.09	6.00	7.00	6.09	5.06
2	NR	WBC (000/ gm.)	7.00	6.50	6.09	3.40	1.20	2.00	1.50	1.00	12.00	10.00	10.00	10.00	10.00	2.00	2.90
3	R	Hb	10.40	10.20	9.60	10.00	9.40	10.20	11.00	10.90	10.00	10.00	10.00	10.00	10.00	11.00	11.60
4	NR	"	5.04	5.00	4.09	4.00	4.50	4.60	4.90	5.00	5.09	5.00	5.06	4.06	4.60	4.05	4.08
5	NR	"	9.00	6.00	5.00	7.05	5.00	3.70	3.09	1.80	2.00	3.05	3.00	2.05	3.00	1.09	2.00
6	NR	"	12.00	11.50	10.45	9.60	8.06	9.90	10.00	10.50	10.00	11.05	10.50	11.00	12.00	10.50	11.00
7	R	"	5.00	6.00	5.05	6.00	5.00	4.90	4.50	4.32	4.38	4.50	4.80	4.06	4.09	5.00	5.60
8	R	"	9.80	6.00	6.28	7.00	3.00	1.90	2.00	2.50	1.60	2.80	3.00	2.95	2.95	2.80	3.00
9	R	"	12.00	10.00	10.00	9.00	8.00	9.00	10.00	11.06	12.00	11.90	11.00	12.00	11.00	10.00	10.00
10	R	"	7.05	8.00	7.00	7.00	6.09	7.00	6.50	6.32	4.30	5.09	6.00	6.03	6.03	8.05	6.09
		"	10.00	8.00	6.00	2.00	2.90	2.80	2.00	1.32	1.60	3.00	6.00	7.00	10.00	12.00	16.00
		"	10.00	11.00	11.00	9.00	9.00	8.09	10.00	10.08	11.00	9.00	8.00	9.00	10.00	10.00	9.00
		"	6.00	5.00	5.10	5.06	5.09	6.00	7.00	7.80	6.08	6.09	7.05	8.00	8.00	8.00	8.09
		"	10.00	8.00	8.00	4.00	3.00	3.20	3.00	1.08	1.80	2.00	2.00	2.06	2.08	3.00	3.00
		"	12.00	11.00	12.00	12.50	13.00	12.00	12.00	12.00	11.00	9.40	8.06	6.00	5.20	5.00	5.02
		"	4.5	4.00	5.00	5.60	5.00	6.00	4.00	4.05	4.00	8.06	4.00	6.00	5.00	5.00	5.00
		"	10.00	12.00	9.09	6.00	8.08	4.00	4.20	1.09	2.50	2.00	2.06	2.09	3.00	2.95	2.08
		"	11.00	7.40	8.09	8.00	8.00	9.06	7.40	7.60	6.90	7.00	7.50	8.00	8.50	9.00	11.00
		"	5.00	5.06	6.00	6.50	7.00	7.00	6.90	6.00	6.00	6.00	5.90	5.00	6.00	7.00	15.00
		"	12.00	11.00	9.00	3.00	1.90	2.00	2.00	1.60	1.80	1.90	1.00	2.60	6.00	10.00	15.00
		"	12.00	11.00	7.40	7.60	8.00	7.20	7.00	7.40	7.50	7.00	7.4	5.9	5.00	5.06	4.00
		"	6.00	5.00	5.50	4.90	5.50	5.60	5.00	6.00	7.00	7.00	6.00	5.60	4.20	5.05	5.50
		"	9.00	11.00	10.50	3.90	1.20	1.60	1.90	2.09	1.60	1.00	3.00	2.90	3.05	3.00	3.00
		"	11.00	10.00	7.6	8.40	8.60	9.20	10.00	8.60	7.90	7.00	6.40	7.60	7.50	8.50	9.00
		"	7.00	6.09	6.00	6.20	5.09	6.05	5.00	7.00	8.00	7.02	7.00	6.00	5.00	5.00	4.30
		"	8.00	9.00	12.00	6.00	3.00	2.90	2.90	3.00	10.00	12.00	18.00	16.00	18.00	16.00	14.00
		"	7.4	8.0	9.4	9.6	10.00	9.50	9.60	10.00	8.40	8.50	9.00	10.4	10.05	11.00	9.50
		"	6.00	5.00	4.90	6.00	4.92	5.00	5.60	6.00	6.50	7.00	7.00	6.08	7.00	7.00	7.20
		"	10.00	9.00	3.00	1.90	1.60	3.00	3.10	2.00	2.00	1.20	1.00	0.90	2.00	3.00	4.20
		"	12.00	11.4	10.00	10.00	14.20	11.80	11.50	9.60	9.40	9.50	9.50	9.00	9.00	10.00	12.00

R — Reacted; NR — Did not react.

the classical symptoms of rinderpest in the post-inoculation period, e.g., severe thermal reaction, mouth lesions followed by high incidence of mortality, it cannot be confirmed that these animals were not found susceptible, since, in the groups of buffaloes either injected with the virus alone or in conjunction with small doses of serum, a large number of them, varying between 61.0 to 89.2 percent exhibited significant digestive disturbances which imply a greater incidence of pathogenesis of the virus to the digestive system. This will further be confirmed from table V in which the particulars of haematological studies in respect of 10 adult buffaloes, 5 of which did not exhibit reactions and 5 which reacted, have been presented. It has been well established that there is profound leucopenia in virus infections (Kernkamp, 1939; Lewis *et al.*, 1929) and this has been confirmed in the case of rinderpest as well (Robey *et al.*, 1946). It will be seen from table V that there was profound leucopenia in all these ten animals. The decline in the total leucocyte count was significant and started by the fourth day and was well marked between the fifth and the tenth day. The leucocyte count did not return to normal even by the fifteenth day. The r.b.cs. and haemoglobin remained practically unchanged.

From these particulars it would be apparent that although the incidence of mortality among buffaloes in India may not exceed 25-30 percent, nevertheless, about 90 percent of these may be susceptible in nature. This is important from the epizootiology of the disease in that a large number of such animals may suffer from the disease, exhibiting only mild clinical symptoms, which may at times be overlooked, resulting in wide dissemination of the infection, resulting in severe epizootics. The role of immune carriers of infection and cases of mild infections are a potential factor which have always to be guarded against in keeping a disease like rinderpest in check.

Summary

The susceptibility of adult buffaloes to experimental infection with rinderpest virus alone or in conjunction with small doses of antiserum has been described.

It has been brought out that although the incidence of mortality due to infection may not exceed 25 percent in these animals, as many as 90 percent animals are susceptible suffering only a mild form of disease. The typical haematological changes i.e., leucopenia is evident in such mild clinical cases.

From the epizootiology point of view this is considered important, since such mild cases may be overlooked resulting in widespread epizootics.

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UTILISATION OF FISH BY-PRODUCTS AS CATTLE FEED DIGESTIBILITY AND NUTRITIVE VALUE OF MACEREL MEAL

By

S. S. NEGI and N. D. KEHAR*

Division of Animal Nutrition,
Indian Veterinary Research Institute, Izatnagar (U.P.)

The history of the utilisation of fish by-products in the dietary of livestock is not of a distant past. Less than seventy years ago the fish residues were being used as manure only. According to Orr, Crichton and Green (1922) and Davidson (1928), the Norwegian Government for the first time in 1892 successfully demonstrated by means of feeding and other experiments, the utilisation of fish residues in the manufacture of a meal termed fish meal. Gradually all the countries of Europe took advantage of this demonstration and themselves began to make a large scale use of fish meal. Fish meal as distinct from fish manure

*Present address: Department of Animal Sciences, U.P. Agricultural University, Pantnagar.

was manufactured in England only in the year 1905 and it was not before 1916 that the use of fish meal became common in that country. The utility of fish meal was known in America still later and even till 1946 the production of fish meal in the United States of America was relatively small in comparison with other meals of animal origin (Morrison, 1946). Recently however, the production of fish meal in that country has increased so much so that it has become an important protein supplement (Morrison, 1955). According to Bonde (1938) in South Africa, though from primitive times fish has been directly applied to the soil as fertiliser, its use as a concentrate feed for livestock is almost negligible. The feeding value of fish meal for growing animals, swine, milch cows and poultry has since been well recognised all over the world. It has been shown that the inclusion of a small quantity of fish meal in an ordinary ration produces a marked increase in the utilisation of the feed, lessens the possibility of deficiency diseases and produces extra fat and meat tissue. Bonde has reported that in countries like Germany and Netherlands, where the utilisation of large areas for grazing is precluded, fish meal as a concentrate plays an important role in the agricultural technique adopted to improve the production of livestock.

In India, till recently the by-products of fishing industry were either used as manure in tea or coffee estates or were being largely exported as nitrogenous fertilisers. Though a few backward villagers on the sea coast of India have been from times immemorial carrying on the drying of fish for feeding cattle, it is only after 1925 (Chari and Pai, 1948) that some interest is manifested in the utilisation of waste and discarded fish in the manufacture of fishmeal for feeding animals. Pepperall (1945) has pointed out that in the west of India in the island of Bahain in the Persian Gulf, indigenous cows, in whose ration fish is included thrive well and produce ten to twenty *seers* of milk daily. Negi (1949) has reported the chemical composition of a few Indian fish meals and has observed that, in general, fish meals contain the flesh and bone forming materials, *viz.* protein, lime and phosphate in abundance and in well balanced proportions. It seemed of interest to investigate the feeding value of a few fish meals on Indian cattle. The results obtained with salted mackerel fish meal, received through the courtesy of the Fisheries Technological Station, Calicut, are presented in this communication.

Experimental

Kumaoni bullocks which truly represent their class and are economical to maintain were used as experimental subjects. As fish meal is mainly a protein feed it could best be evaluated as supplement to a nitrogen-low roughage. Wheat *bhoosa* which is very low in nitrogen

and which was successfully utilised by Kehar, Mukherjee and Sen (1943) as an ingredient of a nitrogen-low ration was used as roughage and offered *ad lib.* The maintenance digestible crude protein requirement of the individual animals was supplied through a calculated quantity of mackerel meal, assuming the protein digestibility in the meal to be 81 per cent as averaged by Morrison (1946). The meal being salted no extra salt was provided. The animals were watered twice daily.

After an exploratory period during which the palatability of the meal was examined, four adult animals were put on the scheduled experimental ration of wheat *bhoosa* and salted mackerel meal. The preliminary feeding period of fifteen days was followed by the metabolic period of ten days during which a quantitative account was kept of the feed ingested and the excreta voided by the animals. During this period of 25 days, the animals recorded an average gain of about 4 per cent in liveweight.

Palatability of mackerel meal

The meal was not easily acceptable to all the animals. However they developed a taste for it within about a week when it was fed in combination with a decreasing proportion of a concentrate mixture which was fed to the animals prior to the introduction of fish meal in the ration. The inclusion of the meal in the ration did not affect the total dry matter consumption which was of the order of 1.7 lb. per 100 lb liveweight.

Results and discussion

The chemical composition of mackerel meal and wheat *bhoosa* used in the feeding trial is given in Table I. The crude protein content of the three mackerel meal samples reported by Negi (*loc cit*) ranged between 73 and 77 per cent but in the present case it was as low as 63.25 per cent. This meal however contained a higher proportion of lime and phosphate.

TABLE I
Composition of feeds on dry matter basis (percent)

A. ORGANIC CONSTITUENTS.

	Total organic matter	Crude protein	Ether Extract	Crude fibre	N. F. E.	Total carbohydrate
Salted mackerel meal	75.11	63.25	5.61	0.56	5.69	6.25
Wheat <i>bhoosa</i>	90.46	2.00	0.68	44.22	43.56	87.78

B. INORGANIC CONSTITUENTS.

	Total ash	CaO	P ₂ O ₅	MgO	Na ₂ O	K ₂ O	Cl ₂
Salted mackerel meal	24.89	8.82	8.06	0.80	2.45	0.56	1.84
Wheat bhoosa	9.54	0.31	0.15	0.21	0.05	1.23	0.021

The data for dry matter consumption and faecal output are given in Table II. The digestibility of dry matter in the total ration averages 48 per cent.

TABLE II

Dry matter consumption per day and dry matter digestibility

	Dry matter consumed in gm.			Faecal dry matter gm.	Dry matter digested %
	Wheat bhoosa	Mackerel meal	Total		
Average	2128	152	2280	1175	48.3
± S. E.	178	17	188	88	0.3

The digestibility co-efficients of the whole ration are given in Table III. The average digestibilities of crude protein, ether extract, crude fibre and nitrogen-free extract in the entire ration were 41, 65, 63 and 45 per cent respectively. The nutrients digested from wheat bhoosa were eliminated on the basis of digestibility data given by Sen (1946). The amounts of crude fibre and nitrogen free extract ingested from mackerel meal were too small compared to the large amount of these nutrients ingested from wheat bhoosa and hence the digestibilities of these constituents in mackerel meal have not been taken into consideration.

TABLE III

Digestibility co-efficients of the whole ration

	Crude protein	Ether extract	Crude fibre	N. F. E.	Total Carbohydrate
Average	41.3	64.8	62.5	45.0	53.5
± S. E.	2.7	1.1	0.6	1.6	0.9

The average digestibilities of crude protein and other extract in the meal, as shown in Table IV are 60 and 114 per cent respectively.

The level, the biological value and the true digestibility of crude protein in the entire ration, worked out according to the procedure adopted by Mukherjee and Kehar (1949) are also given in the same table.

TABLE IV

Digestibility co-efficients of mackerel meal and biological value (B.V.) of proteins in the whole ration.

	Digestibility of mackerel meal		Protein in the whole ration		
	Crude Protein	Ether Extract	Level	B. V.	True digestibility
Average	59.8	114.3	6.1	63.0	84.5
± S. E.	2.3	1.5	0.3	2.5	1.3

The percentage digestible nutrients present in the meal, as calculated on the basis of the average digestibility data were digestible crude protein 37.95, digestible ether extract 6.40, total digestible nutrients 52.4 and starch equivalent 50.1. The balance data for nitrogen and minerals are presented in Table V. The average nitrogen balance was slightly negative but those for the other constituents were all positive.

TABLE V

Balance of nitrogen and minerals (in gm. per head per day)

Nutrients		Intake from			Output in			Balance
		Mackerel meal	Wheat bhoosa	Total	Faeces	Urine	Total	
Nitrogen	Average	15.42	6.81	22.23	12.96	9.79	22.75	-0.52
	± S. E.	1.77	0.56	2.21	1.07	1.18	1.99	0.25
CaO	Average	13.45	6.60	20.05	17.66	0.81	17.97	+2.08
	± S. E.	1.78	0.54	1.96	2.14	0.08	2.19	0.35
P ₂ O ₅	Average	12.28	3.21	15.49	12.10	0.87	12.47	+3.02
	± S. E.	1.41	0.27	1.61	1.62	0.05	1.37	0.12
MgO	Average	1.21	4.47	5.68	4.85	1.15	5.49	+0.18
	± S. E.	0.14	0.37	0.48	0.86	0.17	0.44	0.02
Na ₂ O	Average	3.73	1.06	4.79	1.88	1.36	3.23	+1.56
	± S. E.	0.43	0.09	0.49	0.81	0.48	0.86	0.51
K ₂ O	Average	0.85	26.18	27.03	7.81	16.58	24.14	+2.89
	± S. E.	0.10	2.15	2.23	0.71	1.61	2.04	0.33
Cl ₂	Average	2.80	0.45	3.25	0.56	2.51	3.07	+0.18
	± S. E.	0.32	0.04	0.35	0.07	0.77	0.74	0.40

The average digestibility of crude protein in the meal was observed to be only 60 percent, whereas the same had been assumed to be 81 per cent. Evidently the supply of digestible crude protein to the animals was at a lower level than was stipulated according to the Morrison standard and the average nitrogen balance was slightly negative. However, the marginal nature of negative nitrogen balance in animals which recorded a small increase in weight, indicated that the digestible crude protein requirement of the animals was almost met. This follows from the lower maintenance requirements of Indian Cattle of which enough evidence is available in the compilation of Sen (1953).

At the 6.1 percent level of portein in the ration, the biological value of protein averaged 63 per cent and the average true digestibility of proteins was 85 percent as against the apparent digestibility of 41 percent only. Data of the same order were recorded by Mukherjee and Kehar (*loc cit*) for the biological value and true digestibility of proteins in the wheat straw rations supplemented with mustard, colza and groundnut oil cakes at the same level of total proteins in this ration. It may follow that for this class of animals, the proteins of animal origin may not have any superiority over proteins of vegetable origin. However, since in spite of the low digestibility of crude protein in this fish meal, the amount of digestible crude protein available from it is higher than in common concentrates of vegetable origin, it is felt that the fish meal can be profitably used to replace a part of the concentrate quota of cattle in places, where it is available, at an economical price.

Summary

The digestibility and nutritive value of salted mackerel meal have been investigated. The meal contained 63 percent crude protein on dry matter basis and the digestibility of this constituent in the meal by cattle was 69 percent. The percentage digestible nutrients in the meal were D.C.P. 37.95; S.E. 50.1 and T.D.N. 52.4.

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STUDY OF THE LIFE-CYCLE OF THE STABLE FLY *STOMOXYS CALCITRANS* (LINNAEUS, 1758)

By

K. R. LODHA, G.B.V.C., D.V.P., M.S.
Rajasthan Veterinary College, Bikaner.

Introduction

Stomoxys calcitrans (Linnaeus, 1758) is probably the most injurious amongst insects. It is a serious pest of exceptional economic importance, a tormentor of livestock and a carrier of disease. Its painful bites do not allow cattle to graze properly. The animals lose condition and their milk-yield is reduced. It acts as a vector of the most serious protozoan parasite *Trypanosoma evansi*, which causes surra in various domestic animals. It transmits various helminthic diseases of domestic animals and also bites man. Its life-cycle was, therefore, studied in detail under laboratory conditions.

Review of Literature

Newstead (1906), Mitzmain (1913) and Bishop (1916) were amongst the early workers who studied the life-history of *Stomoxys calcitrans* (L.). Glaser (1924) reared stable flies by feeding adults on defibrinated warm horse or cow blood and reported that the latter was very satisfactory. This was the first attempt to eliminate large animals in laboratory rearing. He added a 0.2 percent sodium citrate solution to cow's blood to prevent coagulation which proved effective and had no harmful effects on the progeny of the flies. He also conceived the idea of supplementing the larval medium with yeast cells suspended in water during the winter months which removed the difficulty of breeding the stable fly in winter.

Subsequently Doty (1937), Woodbury (1943), Campan *et al* (1953), Champlain *et al* (1954), Parr (1959) and Appleby and Fisk (1959) reared the stable flies. All of them used citrated bovine blood for feeding the adults, but different rearing media were used to feed the larvae. Doty fed the larvae on Richardson's medium¹ and Campan *et al* on Peet Grady medium². Appleby and Fisk used C.S.M.A. Standard dry medium³ to which dry yeast, dia-malt and water were added in required

quantities. Appleby and Fisk also found that the use of a 275 W type RS Sun Lamp increased the mating actively of the flies and their subsequent egg production.

1. Richardson's medium:—

Wheat bran	3½ lbs.	} Bran mixture
Alfalfa meal	1½ lbs.	
Water	500 ml.	} Water mixture
Yeast	500 ml.	
Diamalt	35 ml.	

Add the water mixture to bran mixture and stir thoroughly.

2. Peet Grady medium:—

Soft wheat bran	1200 gm.	} Bran mixture
Alfalfa meal	600 gm.	
Bakers yeast	30 gm.	} Water mixture
Malt extract	50 ml.	
Water	2700 ml.	

The two are mixed thoroughly and stirred to give a loose texture.

3. C. S. M. A. medium:—

Alfalfa meal	26.67 percent.
Brewers' dried grain	40.00 percent.
Soft wheat bran	33.33 percent.

Materials and Methods

Rearing was done in the Department of Veterinary Parasitology, College of Veterinary Medicine, Ohio State University. The temperature of rearing room was kept at 80° F $\pm$ 4 and humidity 35 percent $\pm$ 5.

The breeding cages were made of wood, 15" $\times$ 12" $\times$ 12". The base and back were solid wood, the two sides and top were covered by 20-mesh wire screen and the front had a two foot long cloth sleeve. The equipment required for feeding the flies, collecting the eggs, and rearing the larvae consisted of feeding pans, house-hold sponage pads, plastic trays and plastic jars.

The feeding pans were shallow circular aluminium dishes 6" in diameter. Each was big enough to hold 200-300 ml. of blood. Egg collecting pads were ordinary house-hold sponge pads, 4" $\times$ 4" $\times$ 1". Plastic trays to hold the sponge pads were 6" $\times$ 4" and made of half inch thick plastic, each having two walls, an inch higher than the sponge pad. The larval rearing jars were made of plastic, 8" in diameter, 7" in depth, each having a capacity of one gallon.

Citrated bovine blood was used to feed the adult flies. In order to have a continuous supply, the blood was periodically collected from cattle slaughtered at the campus meat laboratories. The blood was transferred into 200 ml. plastic cups and stored in a deep freezer.

The larval media, for one jar, consisted of the following ingredients:—

C.S.M.A. Standard dry media	... 275gm.
Baker dry yeast	... 4gm.
Liquid dia-malt	... 6ml.
Water	... 350ml.

The above ingredients were mixed so that the resulting mixture had a fluffy consistency and only a few drops of water could be squeezed from it.

The experiment was started by obtaining 500 pupae from Dr. F. W. Fisk (Department of Entomology) and keeping them in the breeding cage. The flies were fed after completion of emergence. Before being used, the frozen blood was thawed for twenty four hours at refrigerator temperature. It was then poured into the feeding pan and a thin layer of cellucotton placed on it. The cellucotton prevented or atleast minimised drowning or sticking of the flies in the blood. Feeding was done during the morning hours, and blood was changed once every day.

For oviposition, the sponge-pad was soaked in water, wrapped in a paper towel and placed in a plastic tray in the breeding cage. The flies laid eggs on the top of the sponge-pad, and they were removed to a beaker by washing with tap water. The eggs were collected every day prior to feeding and 0.4 ml. of them were seeded in a plastic jar containing freshly prepared larval media. Seeding was done by making a furrow in the media and placing the eggs at a depth of one inch. Temperature was a very critical factor at this point and a fall below 76° F usually resulted in severe growth of fungus in the media.

On the second day after seeding, a one-fourth to half an inch layer of sand was placed on the top of the media, which helped to prevent the growth of fungus and also facilitated the separation of pupae. Moisture was supplied by spraying water directly on to the sand on alternate days. Lack of moisture also resulted in the growth of fungus, and excess of it caused packing of the media adversely affecting the development of the larvae. By the sixth day, a crust was usually formed from the sand and it was very important to crumble this crust into a fine consistency after which water was again added. The larvae fed, grew and passed through all instars and then came to the surface of the media to form pupae. The upper layer of the media containing the pupae was removed to dish-pan containing water, the pupae floated to the surface and were screened off. Pupae thus collected, were placed in a holding wire screen till completely dry. Lots of

400-500 were placed in each breeding cage. The adults emerged in three to five days and started feeding after four to six hours.

Natural conditions of sunlight were substituted by using a 275 W type RS sun lamp which was fixed at a height of two foot above the breeding cage and kept burning for two to four hours daily. It was observed that this increased the mating activities of the flies and subsequently their egg production.

Results

Life-History:—The life-history of the stable fly was observed during eight different rearings. It consisted of four stages; the egg, larva, pupa and adult (Table 1.) The details are listed below:—

The Egg:—An individual egg measured 1.07 mm., was dirty white, elongate and banana-like, having one side curved and the other straight. The straight side had a deep groove widening anteriorly giving it a spatuloid form. The incubation period of the egg at $80^{\circ}\text{F} \pm 4$ was 24 to 39 hours. The larva made its appearance from the egg by splitting the broad end of the groove, leaving it slightly raised.

The Larva:—The young larva was transparent glasslike, very active and hardly visible to the unaided eye. When full grown, it was 1.09 cm. long, translucent and creamy white to pale yellow in colour. This stage was observed to last from 6 days, 9 hours to 8 days, 9 hours. The larva, though very active throughout, had a short period of quietness just before pupation during which it shortened rapidly by contraction of its anterior segments and then assumed a barrel shaped form. It was still yellowish white in colour and parts of its antennae were still visible. It did not, however, take long time to assume the normal chestnut colour of the puparium.

The Pupa:—The pupa 5.08 mm. long, gradually assumed a dark brown colour. Like the larva it also had eleven segments, but its cuticle was smooth and sticky with a row of tactile tubercles around each segment. The adults usually emerged in 3 to 5 days.

The Adult:—The fly began emerging by pushing of the anterior portion of the pupal case causing a transverse slit across its fourth segment. This section fell away and the fly escaped. At its emergence, the fly was small dark grey in colour and had thick rudimentary wings. The beak was not visible and the four segmented abdomen was silvery grey with yellow markings on its ventral surface. The abdomen gradually assumed its normal colour with clove spots on the dorsal surface of the second and third segments. The wings were unfolded and the shining black proboscis projected horizontally in front of the head. The fly had its first blood meal atleast six hours after its emergence

after which its abdomen got distended and the fly appeared very robust.

Mating was observed 3 to 4 days after emergence and egg laying started after another 1 to 2 days. The egg laying was at its maximum during the first week and declined gradually. Egg laying, by some of the females, was observed on the day preceding death.

TABLE I
Period of development in the Life-Cycle of *Stomoxys calcitrans* (L.)

Rearing numbers	Period of incubation of eggs (hours)	Larval stage (Days)	Pupal Period (Days)	Period of Preoviposition (Days)	Egg laying started after (Days)	Total number of Days
1	24-48	7-9	3-4	3-4	1-2	15-21
2	24-36	7-9	3-5	3-4	1-2	15-21.5
3	24-36	7-9	3-5	3-4	1-2	15-21.5
4	24-48	6-8	3-5	3-4	1-2	14-21
5	24	6-8	3-5	3-4	1-2	14-20
6	24	6-8	3-5	3-4	1-2	14-20
7	24-48	6-8	3-5	3-4	1-2	14-21
8	34-48	6-8	3-5	3-4	1-2	14-21
Average	24-39	6 days 9 hours — 8 days 9 hours	3-4 days 21 hours	3-4	1-2	14 days 9 hours — 20 days 21 hours

Discussion

A variety of factors affect the development of the stable fly. Perhaps the most important are temperature, humidity and food for the adults and the larvae. In the present study, the temperature and humidity were controlled and the adults were fed on bovine blood offered daily during the morning hours. Any irregularity in feeding, or feeding the flies on the same sample of blood for more than 24 hours, had an adverse effect upon the development of flies and egg laying was reduced appreciably. Natural condition of sunlight imitated by the use of sun lamp, also increased the egg laying of the flies. It is evident, therefore, that warmth, sunlight and fresh bovine blood offered at regular intervals caused a more rapid development of the flies and resulted in more eggs produced.

According to Mitzmain (1913), the stable flies copulate when they are 7 days old and lay eggs when they are 9 days old. In this experiment, it was observed that the flies copulated 4 days after emergence and laid eggs when they were 5-6 days old. The controlled laboratory conditions, regular feeding of the adults and the use of standard C.S.M.A. media for rearing the larvae, must have been factors in the rapid growth and prolific breeding of the flies at an early age.

Appleby and Fisk (1959) reported that a fall of temperature below 80°F causes severe growth of fungus in the larval rearing media. In this study, the temperature of the rearing room fell to 76°F on many occasions, yet no fungus was seen in the media. Fungus growth was noted in the media at room temperatures below 76°F and when proper moisture was not available. It is apparent that the fall of temperature alone is not responsible for the growth of fungus. Temperature lower than 76°F and moisture less than optimum for the larvae are very likely to result in the growth of fungus in the media.

Summary and Conclusions

The technique to study the life-cycle of *Stomoxys calcitrans* (L.) at a temperature of 80°F ± 4 and humidity of 35 percent ± 5 was described. Natural sun light was substituted by the use of a W type RS Sun Lamp for two to four hours daily to stimulate the flies for laying more eggs. Eggs were collected daily. The standard C.S.M.A. media was used for rearing the larvae.

The temperature and humidity of the rearing room had a great bearing on the development of larvae and growth of fungus in the media. Optimal conditions for the development of larvae and prevention of fungus growth were described.

The life-cycle of the stable fly reared in the manner described, was completed from egg to adult stage in a minimum of 10 days and a maximum of 15 days, and that from egg to egg stage in a minimum of 14 days and maximum of 21 days. The maximum life span of the fly was observed to be 44 days.

Acknowledgments

The author feels much grateful to his advisor, Dr. Fleetwood R. Koutz, Chairman of the Department of Veterinary Parasitology, Ohio State University, for his advice, guidance and encouragement throughout the duration of this work. He also expresses his gratitude to Dr. F. W. Fisk of the Department of Entomology, for his useful suggestions and time very unselfishly given on various occasions.

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INCIDENCE OF BRUCELLA REACTORS AMONG GOATS AND SHEEP IN ORISSA

By

J. DAS, S. N. PANDA and N. K. DUTTA,

Department of Bacteriology, Orissa College of Veterinary Science and Animal Husbandry, Bhubaneswar.

Studies on Brucellosis in domesticated animals in India, in the past, have been mostly confined to contagious abortion in cattle; but, comparable knowledge on Brucellosis in other domesticated animals, specially goats and sheep, is rather scanty.

Brucellosis occurring in goats in India is known since 1934 when Haddow carried out agglutination test on large herds and found a considerable number of reactors to *Brucella abortus* antigen. His finding has been subsequently confirmed when *Brucella abortus* was isolated from milk of goats in a badly infected farm in the Punjab (Nilakantan and Pande, 1948). In a country-wide survey into contagious abortion of cattle, sheep and goats Polding (1948) observed that atleast in two goat farms abortions were associated with *Brucella abortus* infection. The overall incidence of Brucella infection in goats and sheep in the

States of C.P., Hyderabad, Madras, Mysore, Southern Bombay and Orissa, where bovine Brucellosis was significantly high, was 3.1%, the greatest incidence being found around Nellore and Orissa. At Visakhapatnam it was less than 2%. Slaughter house examination of sera samples carried out by the same worker revealed that isolated reactors (2.5%) were encountered only in South India, where Brucellosis was common in village cattle. At Karnal the incidence of positive reactors among slaughter house goats was found to be 8.3% and among sheep 7% (Mathur, 1953) and a State-wide survey has shown that in Punjab the percentage of positive reactors among goats in different parts varied from 0 to 3% (Sharma, 1958). Interest on Brucellosis has received new impetus among Veterinarians when Mathur (1959) reported several cases of human infection caused by *Brucella melitensis* in the Punjab and need for intensifying investigations on animal and human Brucellosis has been amply stressed (Editorial, Ind. Vet. J., April, 1959-1969). This paper puts on record our observations on the incidence of Brucellosis in goats and sheep in the State of Orissa.

Materials and Methods

A total number of 235 sera samples were collected during August, 1960 to January, 1961 from goats and sheep slaughtered for meat purpose at Bhubaneswar slaughter house. Such animals are purchased by butchers from villages near about Bhubaneswar, but are at times brought from the adjacent districts of Cuttack and Ganjam. On all occasions sera were examined on the day of collection and positive or doubtful samples were stored unpreserved in the refrigerator at 4°C for tube agglutination test. Usual techniques of carrying out seroagglutination tests against Brucellosis (Dhanda and Rajagopalan, 1949) were employed and both the rapid plate as well as tube agglutination tests were carried out using standard antigens supplied by the I.V.R.I. In the case of tube agglutination test, however, 50% agglutination at the last dilution of the serum was taken as the end titre and the recent method of expressing serum titre in the form of units was followed in all positive cases (Report, 1958). As with cattle sera, a titre of 100 units per ml. was considered as diagnostic.

Results and Discussion

The results of our tests are given in the following table which shows that the overall incidence of *Brucella* reactors in goats and sheep of this area varied between 2.47 to 5.19%, the highest being found in goats and the lowest in sheep, though in the latter species the total number of animals examined are comparatively less than goats.

In a few samples reacting to the plate agglutination test it was observed that they reacted weakly to the tube agglutination test, the

titre varying from 20 to 80 units per ml. This might either be due to a low grade infection of *Brucella abortus* in goats and sheep or might have been due to the sera having been obtained from animals at different stages of infection.

TABLE I
Incidence of *Brucella* reactors among slaughter house goats and sheep.

Species	Sex	Total No. of sera examined	No. found Positive	Percentage of reactors	Overall incidence %
Goats	Female	137	8	5.84	5.19
	Male (Castrated)	17	0	0	
Sheep	Female	48	1	2.08	2.47
	Male	33	1	3.03	

It may be pertinent to state here that during 1957-58 the entire lot of animals of Sundergarh goat farm consisting of about 100 goats were tested for Brucellosis separately by Das and Sharma with negative results. Fortyone goats of Bhubaneswar goat farm, when tested with *Brucella* antigen during 1959-60, had also reacted negatively. This might be due to the fact that proved negative animals are always purchased and infected cattle, goats or sheep of the areas had no access into these farms. During 1960-61 out of a total of 42 Beetal bucks imported from the Punjab, when examined before purchase, one was found to react positively and another gave doubtful reaction.

Our figures of positive *Brucella* reactors in goats and sheep in this area compare well with those reported by Polding (1948) in goats and sheep as well as by Sharma (1958) in goats of the Punjab. Basing upon his own observations Polding (*loc. cit.*) was inclined to believe that "the susceptibility of Indian sheep to Brucellosis is indeed slight". Under village conditions sheep and goats remain in close contact with cattle, some of which are infected with *Brucella abortus*. In Bhubaneswar area, small-scale survey work carried out by us has indicated that atleast 30% of the cattle are infected as judged from positive reactors and in one instance 9 out of 12 cows of one village were found positive. If such cows form a constant source of infection to goats and sheep, Polding's contention appears to be true in view of the low percentage of positive reactors in goats and sheep in this area. Recent observations (Renoux, 1957) further indicate that in a portion of goats and sheep a form of natural recovery following infection probably exists in nature. We have not attempted to isolate the causative agent(s) from reactor animals and it is therefore difficult to say whether *Brucella abortus*

(Nilakantan and Pande, *loc. cit.*) or *Brucella melitensis* isolated from cases of human infection (Mathur, 1959) or both these species are responsible for the positive reactions observed in some of the goats and sheep of this area.

Summary

The incidence of positive *Brucella* reactors among slaughter house goats and sheep at Bhubaneswar was investigated using rapid plate as well as tube agglutination tests. It was found that the reactor percentage was 5.19 in goats and 2.47 in sheep. These figures are significantly low as compared to the high incidence (30% and more) of *Brucella* reactors in cattle of the area.

Acknowledgment

We are thankful to Sri B. N. Sahoo, Assistant Professor of Food Hygiene of this college for his help in getting sera samples and to Dr. G. Biswal, Director of Animal Husbandry & Veterinary Services, Orissa and Sri B. N. Patra, Principal for their encouragement in pursuing this work.

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A METHOD OF STAINING FOR DIFFERENTIAL LEUCOCYTE COUNT OF THE FOWL BLOOD

BY

K. T. K. NAMBIAR, A. T. VENUGOPAL,
and

K. N. GOVINDAN NAYAR,
Department of Physiology, Madras Veterinary College.

Introduction

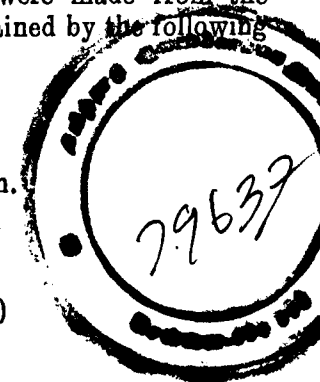
Olson (1935), Natt and Herrick (1954) and Crass and Rigdon (1954) reported difficulty in recognising the eosinophiles in avian blood smears stained with Romanowsky type of stains. Twisselmann (1939) used supravital technique as well as Wright's stain, but he did not attempt to differentiate heterophiles from eosinophiles. Diesem, Venzke and Moore (1958) could not differentiate the eosinophiles from the heterophiles by the Romanowsky types of stains, and found that special stains used to differentiate mammalian eosinophiles from other granulocytes were of little value for differentiating avian eosinophiles from the heterophiles. Olson (1935) mentioned that some European workers questioned even the existence of eosinophiles in avian blood.

While working on the haematology of the domestic fowl, the present authors had experienced difficulty in differentiating the eosinophiles in blood smears stained with Leishman's stain. It was proposed to study the suitability of the different methods of staining employed with the mammalian blood, for a differential count of the leucocytes in the blood of the domestic fowl.

Methods and Materials

Thin smears on clean grease-free slides were made from the peripheral blood of fowls. The smears were stained by the following methods.

- I. Romanowsky stains-Gradwohl (1956)
 - (a) Wright's stain.
 - (b) Bercovitz modification of Wright's stain.
 - (c) Giemsa's stain.
 - (d) Leishman's stain.
- II. Supravital technique - Wintrobe (1956)
- III. Peroxidase stains - Wintrobe (1956)
 - (a) Goodpasture's method.
 - (b) Washburn's modification of Osgood and Ashworth's method,



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- (c) Copper peroxidase method of Sato and Sekiya.
- (d) Copper peroxidase method of Sato and Sekiya, modified by the present authors by using Wright's stain for counter-staining instead of Safranin.

Results and Discussion

Of the Romanowsky stains Wright's stain was found to be the most suitable. All the blood cells were stained well. The rod shaped granules of the heterophiles were stained bright red and the spherical granules of the eosinophiles were stained dull red. But these two types of cells could be distinguished only with difficulty. With the Bercovitz modification the nuclei and the granules took a lighter stain and it was difficult to differentiate the varieties of granulocytes.

With the supravital technique the cells and their nuclei were only lightly stained and differentiation between the varieties of leucocytes was difficult.

The Peroxidase methods of staining showed that the eosinophiles of avian blood were peroxidase positive while the other leucocytes were peroxidase negative. This is in contrast to mammalian blood in which eosinophiles and neutrophils are peroxidase positive and other leucocytes peroxidase negative. On the basis of peroxidase staining the heterophiles of avian blood therefore, are not the counterparts of the neutrophils of the mammalian blood.

Among the peroxidase staining methods the copper peroxidase method of Sato and Sekiya gave better results than the others. The spherical granules of eosinophiles took up a distinct brownish yellow colour. The safranin counterstain used was taken up only lightly by the other cells, and leucocytes other than eosinophiles could not be differentiated from one another. When Wright's stain was used as the counterstain each variety of the leucocytes could be clearly differentiated from the others. The appearance under the microscope of each of the varieties of leucocytes in the blood smear stained by the authors' modification of copper peroxidase method of Sato and Sekiya is described below.

- (a) *Eosinophiles*: The granules are stained yellowish brown and the nuclei light purple.
- (b) *Basophiles*: The granules are stained dark purple and the nuclei light purple.
- (c) *Heterophiles*: The lightly stained granules give the cytoplasm the appearance of an irregular network. The nuclei are stained light purple.

- (d) *Monocytes and lymphocytes*: The nuclei are stained bright purple and the cytoplasm light blue.
- (e) *Erythrocytes and Thrombocytes*: The nuclei are stained dark purple and the cytoplasm of most of the cells is only lightly stained.

It may be mentioned that the heterophiles because of the very light stain taken up by their granules are likely to be missed unless care is taken to identify them by their bilobed nuclei that are better stained. Once the nucleus is noticed, the granules around, in the shape of an irregular network can easily be identified.

The technique of staining by this modified method is given below, for those without ready access to the literature cited.

Modified copper peroxidase method of Sato and Sekiya.

Reagents.

Solution A - Copper sulphate solution 0.5 percent.

Solution B - Rub 0.2 gm Benzidine with a few drops of water in a mortar. To this add with constant stirring 200 ml. distilled water. Filter and add 4 drops of 3.0 percent hydrogen peroxide. If kept in dark when not in use, the solution will keep for a year.

Technique: Apply solution A to a fresh dry blood smear and allow it to act for half to one minute. Pour it off. Apply solution B and allow to act for half to one minute. Pour this off, flush once with distilled water, drain and allow to dry. Counterstain with Wright's stain for 10 minutes. Wash and dry.

Summary

1. The different stains usually employed for staining blood smears were tried to study their suitability, for making a differential leucocyte count in the blood smear of the domestic fowl.
2. The eosinophiles being the only peroxidase positive leucocyte, could be easily differentiated by the copper peroxidase method of Sato and Sekiya.
3. Wright's stain gave the best results out of the Romanowsky type of the stains tried.
4. A modification of the copper peroxidase method of Sato and Sekiya, with Wright's stain as the counterstain is offered by the authors, as a satisfactory method of staining avian blood smears, for making a differential leucocyte count.

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BIOMETRICS OF RAM SPERMATOZOA

By

A. K. RATHORE,

*Division of Animal Genetics,**Indian Veterinary Research Institute, Izatnagar, U.P.*

An ejaculated semen sample consists of spermatozoa which are formed at different times. Some are formed earlier than others before they are ejaculated. Like all cells, spermatozoa soon after they are formed undergo aging process. With the passage of time the potential viability of the spermatozoa will become less and less. As a result an ejaculated sample may contain viable (unstained), dead (stained) and partially stained spermatozoa which are in the process of losing their potential viability and acquiring the physico-chemical properties which constitute death. Pande, Mukherjee and Bhattacharya (1961) are of opinion that partially stained spermatozoa, if not completely dead as shown by the fully stained spermatozoa, are possibly in the process of losing their viability. The present study was undertaken with a view to finding out if there was any difference in the size of unstained and partially stained spermatozoa of freshly ejaculated semen samples.

Materials and Methods

Experimental animals consisted of five adult Bikaneri rams. Twenty semen collections were made, four from each ram using an artificial vagina. Soon after the collection one drop of semen was withdrawn from each collection and mixed with three drops of nigrosin-eosin stain. From the mixture of semen and stain four thin smears were made on slides. The slides were dried on warm stage at 37°C and mounted in D.P.X. The composition of stain was nigrosin (G.T. Gurr) 10 g., eosin (G.T. Gurr) 1.67 g. and 100 ml. of distilled water (Hancock, 1951). There were twenty collections altogether and 80 slides were prepared and the following observations were made.

In each slide four unstained spermatozoa with a clear outline of the head were selected at random in a field where the nigrosin eosin stain was thin; the thickness of the stain did not affect the proportion of stained spermatozoa (Campbell, Dott and Glover, 1956). The *head length* and *head breadth* of the selected spermatozoa were measured by using an ocular screw micrometer and oil immersion phase (1.8 mm) objective (Final magnification x 1455) with blue light filter. The *head length* and *head breadth* included only the maximum length and breadth of the sperm head as described by Mukherjee and Bhattacharya (1949). From the four measurements the average *head length* and *head breadth* was calculated for the slide. Similarly the *head length* and *head breadth* of partially stained spermatozoa were measured. The partially stained spermatozoa included those with stain in the posterior half of the head.

Results and Discussion

TABLE

Mean head length and head breadth in micron of unstained and partially stained ram spermatozoa

Ram No.	Head length		Head breadth	
	Unstained spermatozoa	Partially stained spermatozoa	Unstained spermatozoa	Partially stained spermatozoa
251	9.5168	9.4850	6.2224	6.1186
245	9.4098	9.4785	6.1700	6.1177
81	9.4984	9.4719	6.0990	6.0486
52	9.4429	9.4168	6.1504	6.0654
244	9.5355	9.5355	6.1691	6.0719
Mean	9.4794	9.4775	6.1626	6.0841
S. E. of Mean	0.0682		0.0766	

Main results based on the data are summarised in Table. It will be seen from the Table that the mean *head length* of partially stained spermatozoa was approximately 0.0019 micron shorter than those of unstained spermatozoa. The mean *head breadth* of partially stained spermatozoa was approximately 0.0785 micron shorter than those of unstained spermatozoa. A 't' test showed that these differences were not significant.

From the results of the present experiment it is evident that there is no significant difference in the size of the head of unstained and partially stained spermatozoa. Partially stained spermatozoa as observed by Pande, Mukherjee and Bhattacharya (1961) are possibly in the process of losing their viability and acquiring the physico-chemical properties which constitute death. Present results show that

the unstained and partially stained spermatozoa do not differ significantly as regards their head dimensions, though they may differ in other respects like physico-chemical properties.

Summary

Twenty semen samples were collected by means of the artificial vagina from five Bikaneri rams. In each sample, the *head length* and *head breadth* of unstained and partially stained spermatozoa were measured. The following results were obtained from the study:

Although a decrease in the *head length* and *head breadth* of partially stained spermatozoa was observed, they did not vary significantly from those of the unstained spermatozoa.

Acknowledgments

The author is grateful to Shri P. G. Pande, Director, Indian Veterinary Research Institute, Izatnagar for providing facilities during the course of the work.

The author would also like to thank Dr. D. P. Mukherjee, Research Officer (Sperm Morphology) for valuable suggestions in preparing this article.

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A CASE OF BRUCELLA ORCHITIS IN A BULL

By

* J. V. NARAYANA and B. P. RAO

Andhra Veterinary College, Tirupati

Introduction

Brucellosis in animals has been recognised as an infectious disease of great importance throughout the world. In India, the surveys carried out by Polding (1947 and 1948) showed that nearly all organised farms and several village herds were infected resulting in the rate of abortion from 1 to 5%. The literature dealing with brucellosis in bovine males with regard to detailed histopathological changes in

* At present Disease Investigation Officer (Pigs) Andhra Pradesh, Hyderabad (Dn.)

A Case of Brucella Orchitis in a bull

By

J. V. NARAYANA & B. P. RAO.



Fig. 1

Brucellosis—Testis showing thickened tunica and the affected parenchyma.

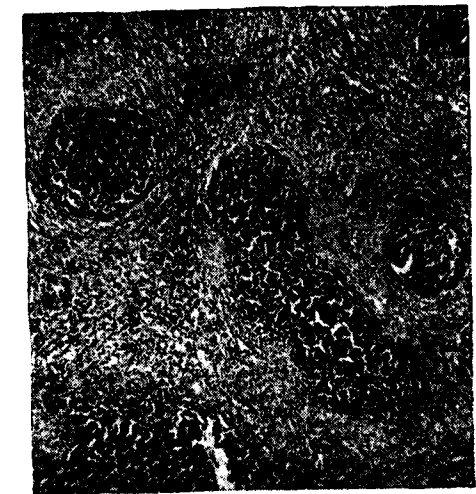


Fig. 2

Brucellosis—Testis showing increased interstitial tissue and necrotic seminiferous tubules (H & E x 35).



Fig. 3

Brucellosis—Testis showing clumps of macrophages, the cytoplasm of which being crowded with Brucella organisms. (H & E x 950)

They Go Abroad



A. VENUGOPALAN, B.V.Sc.,
Lecturer,
Kerala Veterinary College,

has proceeded to Kansas University, U. S. A. for Post-Graduate
Studies in Veterinary Surgery under T. C. M.



S. SRINIVASAN, B.V.Sc.,
Mysore A. H. Deptt.

left for U. S. A. for higher training in Poultry Genetics under T. C. M.

testicles is rather meagre. Jepsen and Jorgensen (cit. Huddleson, 1943) described the pathologic anatomical changes in orchitis in the bull due to *Brucella abortus* infection. Two types of changes were described. In one case the testis revealed areas of dry necrosis with little tendency to softening. In the other form, the infection was characterised by a marked tendency to "Purulent liquefaction". Smith and Jones (1957) described the lesions in males as of the indurative nature affecting the testicle as well as the tunica vaginalis. They were of the opinion that necrosis of the contents of the sac resulted in suppuration only occasionally. The present case of *Brucella* orchitis in a bull is reported with a view to describe the gross and microscopic changes in detail.

Case History

The animal was a six-year old small-sized cross Hallikar bull, admitted into the Andhra Veterinary College Hospital, Tirupati. The bull was admitted on 25-3-1960 with a history of swollen right testicle. The body temperature on the day of admission was 102.0 F. After a period of preliminary treatment with external applications, surgical operation was resorted to and the affected testicle was removed by ligature method under epidural anaesthesia. During the period of stay in the hospital, the animal's temperature was fluctuating between 10.02 to 103.0 F. The animal was taken away by the owner on 4-5-1960.

Materials and Methods

Paraffin sections were taken and stained by H. & E. method. A few sections were stained by Gram's method; a few others were stained by 0.1% carbol fuchsin for 15 minutes followed by decolourisation with 1% acetic acid and counterstained by methylene blue to demonstrate the causal organisms. Serum from the bull was subjected to tube agglutination for Brucellosis.

Gross Pathology

The affection was unilateral, the right testicle being affected and was very much swollen. It measured 8 inches in length and 4 inches in width and weighed 2 pounds. The tunica vaginalis was very much thickened, enclosing inside a pad of thickened "Septula testis" dividing the testicular parenchyma into isolated areas. The testicular parenchyma appeared in the form of yellowish areas, undergoing necrotic and liquefactive changes.

Microscopic Pathology

The tunica vaginalis and the tunica albuginea were thickened, the latter especially being made up of an abnormally thickened zone

of connective tissue cells with a large quantity of collagen. The tunica albuginea was very vascular and was infiltrated in its deeper parts with plasma cells, lymphocytes and a few neutrophils. The "septula testis" is similarly thickened and was made up of young connective tissue cells with a cellular change consisting of clumps of plasma cells, lymphocytes and eosinophils in a more or less granulomatous condition. The seminiferous tubules were subjected to pressure atrophy and were in a state of necrosis and liquefaction. The surviving seminiferous tubules fail to show the various gradations in the development of spermatozoa. In a few places they exhibited clumps of large mononuclears, engulfing the organisms.

The section on staining with dilute carbol-fuchsin using 1% acetic acid for decolourisation revealed numerous pinkish stained cocco-bacillary organisms crowding the cytoplasm of the macrophages. The organisms in section on gram's staining proved to be gram-negative.

Sections taken from epididymal region showed similar changes as in the testis but for the fact the large mononuclear cell reaction was at a minimum. The epididymal ducts revealed the presence of eosinophilic structureless masses with a few leucocytes in their lumina. The epithelium of the duct showed little change of damage. No organisms could be demonstrated in the tissue sections of epididymal region.

The serum samples were subjected to tube agglutination test for Brucellosis and a titre of 1:160 was obtained.

Summary

(1) A case of Brucella orchitis in a cross-Hallikar bull is reported.

(2) The gross and histopathology of Brucella orchitis are detailed.

(3) The diagnosis was based on the serum titre of 1:160 by tube agglutination method and by the demonstration of characteristic Brucella organisms in sections by the modified Ziehl-Neelsen's staining method.

Acknowledgment

We wish to thank the Officer i/c. Surgical Ward of Andhra Veterinary College Hospital for providing the specimen and serum samples. Our thanks are also due to Dr. P. M. N. Naidu, Director of Animal Husbandry, Andhra Pradesh for his encouragement and for the kind permission for publication of this note.

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Clinical Articles

A CASE RECORD OF KEROSENE POISONING IN TWO GOATS

By

M. H. PATHAN, B.Sc. (Vet.)

Veterinary Officer, Karjat (Kolaba), Maharashtra.

Introduction

Poisoning of domestic animals due to either intentional administration or accidental in-take of fuel-oils such as Kerosene, Petrol, etc., is not very common. In India, kerosene is almost always available in a house or a farm, but the methods of storing it are such as not to allow the domestic animals to have an easy access to it. Moreover, kerosene has got a very repulsive smell and taste. These, probably, are the reasons why cases of kerosene poisoning in domestic animals are rare, though not altogether unknown.

Fuel oils have been responsible for occasional deaths in cattle and other animals. Literature dealing with such occurrences have been reviewed by Gibson and Linzell (1948). Eaton (1943) and Parkar and Williamson (1951) give instances of the voluntary consumption of tractor vaporizing oil by cattle; in both cases water was not readily available. In another case, cattle drank from a trough inadvertently contaminated with tractor paraffin (Gibson and Linzell, 1948). Severe toxic symptoms with some fatalities were observed in cattle which had consumed large quantities of oil (Garner, 1957). The present author came across two cases of kerosene poisoning in goats and these are recorded.

History

On a very hot and sunny day, last year at Vijaynagar, District Sabarkantha, two she-goats rushed into their owner's grocery shop and quenched their thirst with kerosene stored in a four-gallon tin with an open top. By the time they were hushed away approximately twelve pints of kerosene was consumed. The owner who was amazed by this unusual incident was alarmed when he saw the two goats becoming restless, and sent for me. Before I reached there at about 11 A.M., the two goats had straggled to a water tank and consumed large quantities of water. Both goats were reported to be pregnant.

Symptoms

The animals were extremely restless and completely off-feed but very thirsty. Abdomen was greatly enlarged, especially on the left side; splashing could be heard and waves were felt on percussion. Difficulty in respiration was evident due to pressure of abdominal contents on the respiratory organs. Gait was staggering and animals were inclined to lie down. Temperature was normal but pulse rate was slightly increased.

Diagnosis

Diagnosis was obvious from the history and from the characteristic odour of kerosene about the animals.

Treatment

In the absence of any specific treatment, symptomatic treatment was undertaken. To begin with, a dose of olive oil was administered to both the goats with the intention of counteracting the irritating action of kerosene on alimentary canal. Warm soap-water enemata followed by a purgative dose was also given as elimination of kerosene from the body is known to be retarded by the constipation which invariably develops in such cases. However, in view of the fact that the ordinary drugs used would require quite considerable time to act, immediate removal of the fluid contents of the rumen was considered essential to relieve the abdominal pressure and to prevent absorption of large quantities of kerosene. Taking all usual aseptic precautions, rumen was, therefore, punctured with large cattle-inoculation needle and as soon as the stellate in the needle was taken out ruminal fluid having a strong smell of kerosene started gushing out. The animal was held in such a position as to allow most of the fluid to pass out through the needle. Sometimes, application of judicious pressure on the abdomen was necessary. When the pressure of ruminal fluid was relieved to some extent and was too insufficient to force out the fluid, help of a 50 c.c. syringe was taken to aspirate the fluid. Occasionally, when the needle got blocked by the solid ruminal contents the blocking material was forced back into the rumen by injecting small quantities of normal saline solution. The needle was removed when no more fluid could be aspirated. Fluid measuring 8 pints and 7 ozs. from one and 7 pints and 3 ozs. from the other goat was thus removed. Respiratory distress was greatly relieved after this operation and the goats appeared a bit comfortable.

During this period both the goats had passed faeces of normal consistency but it was reported that one had not passed urine.

At 5 P.M. both the animals looked in somewhat better spirits but one had not still passed urine. Faeces of both the goats were by now loose and had a strong smell of kerosene,

At 7-30 P.M. the goat which had passed both faeces and urine appeared comparatively much better than the other, and was nibbling the grass. It started feeding and ruminating the next day but a course of laxatives and diuretics and urinary antiseptics was given for three days. Gradually, this goat recovered completely and delivered two healthy kids about a month later.

The other goat, however, did not show any further improvement. Gradually, its respirations became rapid and shallow and ultimately the goat vomited, collapsed and died early next morning.

Gibson and Linzell (1948) suggest a combination of gastric lavage and intravenous glucose with, perhaps, oxygen therapy. However, this was not practicable in the present cases for want of suitable facilities.

Post-Mortem

Mucus membrane of the whole of the alimentary canal showed signs of severe inflammation. Kidneys were highly inflamed and urinary bladder contained only a small quantity of urine with slight smell of kerosene. Foetus of about 3½ months was recovered. No visible changes were seen in lungs, though lesions in the lungs have been described varying from multiple minute haemorrhages and emphysema (Parker and Williamson, 1951) to actual bronchitis, bronchopneumonia with great congestion, oedema and haemorrhage and some necrosis of the lung parenchyma (Gibson and Linzell, 1948). It is obvious in the latter case that fluid had been aspirated into the lungs. Aspiration is considered to be the most serious and usual feature of paraffin poisoning in man (Richardson and Pratt Thomas, 1951). Parker and Williamson consider that the lung injury observed in their case was not due to fluid entering the lungs, but to the irritant effect of the continuous excretion of small amount of paraffin.

General Remarks

The object of this article is to bring on record a type of case rarely met with. The result of the treatment given may indicate the line of treatment to be tried in such cases under field conditions.

Acknowledgment

My sincere thanks are due to Shri P. K. Dakshinkar, District Animal Husbandry Officer, Nagpur for this guidance and encouragement in writing this article.

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TREATMENT OF TEAT-FISTULA IN MILKING ANIMALS

By

T. H. GUDI, B.Sc. (Vet.)

Veterinary Officer, Viramgam, Gujarat State.

Perforating injuries of teats in milking animals are head-aches for Veterinarians. In spite of all kinds of treatment the fistula persists without healing and milk flows freely through the same.

As per Dollar's Surgery the prognosis is that a fistula on the teat is difficult to heal. Mossu's method of operation is also given. But at the end it is said "As a rule, however, it is hardly worth while operating until the animal has gone dry". But I have treated 2 milking goats with the following technique and have been successful:—

The method of treatment:—

1. Cast the animal and secure properly.
2. Freshen the edges of fistula, if old.
3. Empty that part of the udder completely and hold the teat in such a way that no milk flows out. This should be observed strictly till the end.
4. Paint with weak Tr. Iodine and dust Sulphanilamide.
5. Make interrupted deep sutures by Lambert's bowel suture method.
6. Make loose skin sutures only to support the deep sutures.
7. Paint with Liq. Iodi Mitis and dust Sulphanilamide.
8. Apply a pressure bandage over the wound. If ordinary bandage does not remain in position, sticking plaster may be used instead.

When the animal is made to stand no milk comes through the wound.

Next day, the portions above and below the bandage are distended and the bandaged part remains dry. Even the last drop of milk can be stripped off by applying pressure to both the distended parts only. The bandage may be kept for 7 days. Thereafter all sutures are removed and the wound dressed and bandaged.

There is no necessity to emphasise on the aseptic precautions and anti-biotic treatment. The method can be well adopted in cows and buffaloes also.

Abstracts

Standardized treatment with Trypan Blue for Demodectic Mange.—
Hurov, L. (1961). *Mod. Vet. Pract.*, 42, 62.

The report was based on the treatment of 25 cases of demodectic mange in dogs. Three or four treatments at weekly intervals involving intravenous administration of 1% Trypan Blue at a dose rate of 0.5 c.c. per pound body weight were given. The injections were given slowly to prevent vomition caused by the rapid administration of the drug. Toxic reactions if any were circumvented by giving Acepromazine i/m and a Penicillin Streptomycin mixture as well as vitamin B complex injectables. This systemic treatment resulted in the cure of 22 dogs.

V.S.A.

Stephanofilariar skin lesions in cattle; systemic therapy with Stibophen or Neguvon—Versuche mit der Allgemeinbehandlung der Stephanofilariose ("Sommerwunden") des Rindes mit Antimosan and Neguvon.—By Radermacher, F. (1961). *Inaug. Diss.*, Hannover, pp. 38.

In 42 out of 53 cattle in north-western Germany infected with *Stephanofilaria*, lesions were localised in the udder. One group of 21 was treated at weekly intervals with 3 subcutaneous injections of Stibophen, in doses of 0.63 g. per 50 kg. body weight, the total single dose however, not exceeding 6.3 g. Twelve were cured and seven improved within 2-6 weeks. In 12 there was reduction in milk yield, muscular tremor, malaise and local reactions at the site of injection.

Twenty-five of 32 cattle of group two responded to one oral dose of 60 mg./kg. body weight of Neguvon. Of the remainder three improved after a second dose 3-4 weeks later.

In six of 16 of the Stibophen group and in one of 28 of the Neguvon group there were relapses a year later. Three of six with relapses were cured after one or more doses of Neguvon and two improved.

Vet. Bull., 31 (8), 471-472. (2648).

Influence of Autonomic Nervous System on Bloat.—Leffel, E. C. and Komarek, R. J. Experimental production of bloat with various chemicals. *J. Dairy Science*, Vol. 44, No. 9, September 1961.

The very concept of etiology of bloat has been changed. Workers have been able to produce bloat in 42 out of 47 sheep by simultaneous injection of atropine (0.87-1.93 mg/kg/hr) and epinephrine (0.09-0.19

mg/kg/hr). Orally administered L. tyrosine in quantities that could be readily consumed in green legumes (1-5g), replaced epinephrine in 17 cases of experimentally produced bloat. The possible conversion of tyrosine to tyramine, a sympathomimetic agent, was suggested and finally concluded that natural bloat is the result of inhibition of eructation by compounds found in legumes either directly or indirectly as metabolic products of the rumen micro-organism and that those compounds cause the inhibition by imbalancing the autonomic nervous system.

N. SATAPATHY.

Forage Nutritive Value as Affected by Fertilizer Application.—Kene, E. A. and Moore, L. A. Forage Nutritive value as affected by fertilizer application. *J. Dairy Sci.*, 44, 1457-1464. 1961.

Research done at the United States Department of Agriculture Research Center, Beltsville, Maryland, had indicated that the digestibility of green forage is affected by fertilizer application. After the first cutting a section of an orchard grass field was treated with 100 pounds of ammonium nitrate per acre. No fertilizer was applied to the remaining portion of the field. Digestibility of the two forages were determined by six cows in milk divided randomly into two groups of three. The result showed that under favourable weather conditions digestibility as well as dry matter and energy yield of the forage can be significantly increased by use of fertilizer. Increased plant pigment content was found to be associated with higher forage digestibilities. Forage harvested on the same date but given dissimilar amount of fertiliser was found to differ in digestibility and feeding value.

N. SATAPATHY.

Role of Cobalt on Ruminant Nutrition.—Deficiency of cobalt in ruminant animals has been a common nutritional problem now a days. Animals raised on areas deficient in cobalt or fed forages grown in cobalt deficient soil, manifest the symptoms of deficiency.

The principal symptoms observed is gradual loss of appetite. The animal refuses hay, grain and even to graze on a lush pasture. It becomes anemic, weak, emaciated, and develops rough coat.

0.1 mg. of cobalt per day for each 100 pounds body weight has been proved to be sufficient for both the ruminants. Feeding more than the quantity recommended may produce toxic effect. The most convenient way of its use is by dissolving 4 grams of cobalt sulphate (containing 20% of cobalt) in one gallon of water and feeding one teaspoonful of this solution to 1000-pound cow or ten 100-pound sheep.

Leaflet No. 488, Cobalt deficiency in soil and forages, United States Department of Agriculture, April, 1961.

N. SATAPATHY.

News and Views

Pilgrimage to Prosperity :—In launching the first electric locomotive produced at Chittaranjan in West Bengal, Prime Minister Nehru said "India is attaining new heights in industrialisation. There is no short cut to prosperity; nor can it be imported from abroad. It is only through industrialisation that poverty can be eliminated. This electric locomotive, which I am pressing into service to-day has brought us one step nearer in our pilgrimage to prosperity". He never misses an opportunity to din into the ears of his country men that only work — ceaseless work — honest work — hard work — self-reliant work — that can raise to prosperity in all walks of life. Animal Husbandry men are no exception to it.

* * *

The Inhuman Robots in Administration : Mr. Justice Dhavan of the Allahabad High Court, finding a District Judge refusing to condone a delay of eight days in filing an appeal by a poor man who said that the delay was due to his mother's death, which compelled him to stay at home and to his subsequent illness, gave expression to the following remarks which are good to be remembered by all administrators. The learned Judge said "This reveals a callous indifference to a humble person's misfortune which would be unusual even in a hard-boiled bureaucrat, to say nothing of the judicial head of the district. Though justice is to be administered according to law, in many matters, the law confers on the Court a discretion, which the Judge could exercise on sound principles and not like an "inhuman robot" functioning with utter disregard to prevailing social conditions". Lack of courage to take responsibility for their honest convictions and the proper use of discretion vested in them, that is responsible for many such acts.

* * *

"Semi-doctors" for Rural areas :—This is the latest slogan we hear in India to-day. To relieve (?) the lack of doctors in rural areas, decision was taken at a Conference of State Health Ministers to introduce a course of medical education lasting only 1½ or 2 years and posting such men called "Semi-doctors" to rural areas! The Madras City branch of the Indian Medical Association came out boldly with its criticism at a meeting held recently for the purpose. One speaker said

it is better to call them "quarter doctors" as their duration of studies proposed will only be one-fourth of the normal period! Another speaker said "It does not fit in with the sanctity and responsibility of the work they would be called upon to perform".— Yet another speaker said "It is an un-wise and un-fair step and a highly dangerous move".

More constructive proposals came from a few other doctors. They said Qualified persons were reluctant to go to villages, because of the lack of elementary facilities to live in, such as residential quarters, water supply, sanitation, roads, electricity, etc. Are Government looking into these things? Some other doctors were even more constructive in their suggestions. "Raising the retirement age to 60; re-employment of retired persons; increasing the teacher-taught ratio in Medical Colleges so as to ensure greater percentage of passes; use of mobile hospital vans from taluk head-quarter etc." were a few other suggestions. Let the Government beware that the remedy proposed by them will be worse than the disease. A cadre of "fractional doctors" in descending order, depending on the remoteness of villages, will be a mockery in the eyes of the civilised world.

Crucial Plan Periods:—Mr. V. T. Krishnamachari, former Vice-Chairman of the Planning Commission, participating in an anniversary of a Cultural Academy in the City of Madras said "The Third and Fourth Five-year plan periods, are going to be very crucial." We hope so. Let us gird up our loins and face these periods with resoluteness. India expects every man to do his duty!

Misuse of Relief food:—Mr. J. K. Galbraith, the American Ambassador in India did well in sounding a note of warning against the abuse of "gift packets and tins" sent by the people of the United States of America to the poor and needy in India. "Some of them have found their way into the shops and been sold on a commercial basis". Such un-social elements at all levels of distributing agencies should be mercilessly dealt with. His warning has not come a day too soon.

A New Process in the preservation of Milk is flashed all over the world from Sweden. If what is claimed is well deserved, it is going to revolutionise the milk supply and distribution in tropical areas.

"In this new process, milk is pre-heated and then given a shock treatment by being heated to 140°C by jets of hot steam, then quickly chilled by evaporation in a vacuum chamber. This vacuum processing also frees the milk from any feed or similar taste. The milk obtained

by this process is absolutely sterile and can be stored at least for four weeks at temperatures normal in the tropics without any change of flavour, colour or nutrition value".

This is the sort of research that is going on in other countries. Where does India stand in this field?

West Bengal State Veterinary Council:—We are glad to note that the Government of West Bengal have enacted the Veterinary Practitioners Act and have established the State Veterinary Council. The Director of Veterinary Services, Principal, Bengal Veterinary College, Dr. S. Datta, Dr. P. C. Sen Gupta, Dr. S. Gupta, Dr. P. U. Saha, Dr. G. D. Keswani and Dr. Anupam Chatterjee have been nominated by the Government as members of the Council.

Family Planning:—A Dutch cow fertilized by artificial insemination has given birth to quadruplets, three males and a female, on a farm at Rodez in Southern France. All four young are in perfect health and weigh from 100 to 110 kilos all together. The same cow has already dropped twins 1959 and again in 1960.

(Hindu, Oct. 17, 1961).

Kunigal Stud Farm (Bangalore):—The import of three well-bred stallions and 50 broodmares of exceptional quality is among the proposals for improving the Kunigal Stud Farm, located 45 miles off Bangalore. The Government of Mysore have earmarked Rs. 10 lakhs for the improvement of the Farm, whose administrative set-up also is to be reorganised.

This 170 year-old farm covering an area of over 350 acres is ideally situated for breeding horses.

Sport & Pastime, 21—10—61.

African Horse Sickness:—Dr. E. Moulton, Food and Agriculture Organisation vaccine production expert in Turkey, has reported that no case of African horse sickness has been found there during the past six months, and that the threat of the disease spreading to Europe and the U.S.S.R. has receded.

This is the result of emergency action taken by the FAO to control the disease, which caused the loss of more than 800,000

horses in 1960, by forming a "cordon sanitaire". Turkey was the "buffer" against the spread of the disease to Europe.

Vet. Record, 16-9-1961.

* * *

Memorial Hall to a Veterinary Surgeon:—The Dunlop Memorial Hall, now nearing completion at Dreghorn, Ayrshire, will be opened in October.

Dreghorn is the birth place of John Boyd Dunlop, the Scottish Veterinary Surgeon who invented the first practicable pneumatic tyre in Belfast in 1888.

Members of the John Boyd Dunlop family have contributed to the cost of the hall, and the Dunlop Rubber Company has also made a grant.

Vet. Record, 16-9-1961.

Association News

The 15th Indian Veterinary Conference

BULLETIN No. 1

It has finally been settled to hold the 15th Indian Veterinary Conference at Mathura in U.P., on the 22nd, 23rd and 24th January 1962.

The Delegation fee for ordinary members is fixed at Rs. 5/- each and that for the Reception Committee is fixed at Rs. 10/- each for ordinary members and a minimum of Rs. 25/- each for Special Class of Members.

Free accommodation is being arranged for the Delegates; but the boarding charges will be extra. Arrangements for those desirous of attending the Conference with families are also being made, provided due intimation is given to the Secretary of the Conference sufficiently early.

Railway concession has been applied for. Intending Delegates are requested to contact the undersigned, or the Conference Secretary or the Secretary of their respective State Veterinary Association for the necessary forms, which are expected to be ready for issue early in January 1962.

Mathura is a well-known place of pilgrimage with places like Brindavan, Agra, Delhi, Lucknow, etc., close by. It should serve as a fine

opportunity to visit all those famous places with a little extra expenditure. Further Mathura owns a fine Veterinary College run on modern lines and several demonstrations of professional interest are likely to be arranged also. Members should muster strong at the Conference and make it a great success.

Other details will follow in the December 1961 issue of the I.V.J.

7, First St.,
Vidyodaya Colony, Madras-17.
8th November 1961.

V. S. ALWAR,
General Secretary.
The Indian Veterinary Association.

XXI U. P. Veterinary Conference XV Indian Veterinary Conference

NOTICE

The XXI Annual Meet of the U. P. Veterinary Association will be held at Mathura jointly with the XV Indian Veterinary Conference on the 22nd, 23rd and 24th January 1962.

Mathura is a well-known place of pilgrimage, situated on the banks of the Yamuna, about 90 miles from Delhi, while the distance to Agra is only about 36 miles.

Members of the Profession are requested to attend in large numbers. Formal invitation is extended to one and all through this notice while separate invitation with details will follow in due course. The Railway Board has already been addressed for the grant of Railway concession to the delegates attending the Conference. The Professional associations in the different states are requested to kindly co-operate in a large measure and make the conference a great success. Resolutions of vital importance are expected to come up for discussion during the 'Meet'. The declining tendencies in the service conditions of the profession demand a united and firm voice at this juncture before the malady becomes deep rooted.

Accommodation will be provided free to all the delegates, who may please send in their names to the undersigned immediately so as to enable the Reception Committee to make early arrangements suitably. Those desirous of visiting with families may please communicate their requirements at once. Charges for such arrangements are extra.

A Delegation fee of Rs. 5/- is chargeable which may please be sent direct to Sri K. A. Raza, Treasurer, Veterinary Conference, Biological Products Section, Badshahbagh, Lucknow.

The Reception Committee fee has been fixed at Rs. 10/- for Ordinary Members and a minimum of Rs. 25/- for Special Members. Those desirous of becoming members of the Reception Committee are requested to kindly send in their fees and names immediately. The State Associations and individual professional brethren are requested to kindly enlist as many members for the Reception Committee as possible, from their States.

Professional brethren are further requested to please send in their resolutions to this Office sufficiently early. Further details will be announced in the December 1961 issue of the Indian Veterinary Journal.

H. P. KAPOOR,
General Secretary,
Animal Husbandry Training Centre,
Chak-Ganjaria, P.O. Bakkas,
District Lucknow, U.P.

6-11-1961.

Uttar Pradesh Veterinary Association

Proceedings of the Executive Committee Meeting
held at Lucknow on 28th October 1961.

Members Present :—

- | | |
|----------------------|------------------------|
| 1. Sri K. A. Raza. | 5. Sri K. L. Sahani. |
| 2. „ M. L. Verma. | 6. „ V. S. Srivastava. |
| 3. „ V. S. Asthana, | 7. „ H. P. Kapoor. |
| (by proxy) | 8. „ J. B. Prasad, |
| 4. „ M. L. Bhargava. | 9. „ H. C. Joshi, |
| | } by proxy |

The following resolutions were passed :—

1. "The XXI Annual Meet of the U. P. Veterinary Association be held at Mathura jointly with the XV Indian Veterinary Conference on the 22nd, 23rd, & 24th January 1962"

2. "The Director of Animal Husbandry, U.P. and the Principal U. P. College of Veterinary Science & Animal Husbandry, Mathura, be requested to kindly provide necessary facilities and render full cooperation in this connection."

3. "The Delegation fee be fixed at Rs. 5/- per head and that free accommodation be provided to the delegates for the Conference."

4. "The Reception Committee fee be fixed at Rs. 10/- for Ordinary members and a minimum of Rs. 25/- for Special Members."

5. "The members of the Executive Committee of the U. P. Veterinary Association would automatically be the members of the Reception Committee of the Conference."

6. "The General Secretary and the Financial Secretary of the U. P. Veterinary Association be the 'General Secretary' and the 'Treasurer' respectively of the Reception Committee."

7. "The General Secretary be empowered to enter into all correspondence and make all arrangements in connection with the Conference."

8. "The attention of the Government be invited to the discrepancies in the recent advertisement of the U. P. Public Service Commission for the twelve posts of District Livestock Officers published recently :—

- The minimum qualification for these posts should only be a 'degree or diploma in veterinary science';
- Experience of field service is highly essential and must be included and accordingly the age limit be raised;
- The posts of District Livestock Officers require supervision in both Veterinary and Animal Husbandry activities and as such only 'Veterinarians' should be eligible and accordingly the qualifications of 'Ph.D., or M.Sc., in Animal Breeding' should be excluded;
- Candidates for Post Graduate training are deputed as per choice of the Department alone and the seats available are only limited. Thus others desirous of undertaking this training are handicapped. Accordingly this condition of 'Postgraduate training or training in Dairy Science etc.' should be excluded from the advertisement.
- As in para (c) above the duties of a District Livestock Officer do not involve any research work and as such the qualification of 'Knowledge of Bacteriology' should also be excluded from the advertisement;
- Higher qualifications of a recognised Indian or foreign University or Institution should only be included under 'preferential qualifications'.

9. "The Government be moved to see that all promotion posts both in the College as well as in the Field, even for temporary arrangements, should be filled strictly according to seniority, to avoid dejection amongst the Staff." Copy of this be sent to the Chairman, Public Service Commission also.

10. "The Director of Animal Husbandry be requested to kindly see that the seniority of all the Staff in the Department now, is fixed up and the gradation list thus prepared is circulated to all concerned. The undue delay in holding the interview now being held from 30th October 1961 to 4th. November 1961 for confirmation of promotion from Group 'B' to Group 'A' is regrettable. It is requested that in future, the question of confirmation of an individual be considered immediately after he completes his probation period."

A number of other minor details regarding the Conference were discussed and decided upon.

H. P. KAPOOR,
General Secretary.

The Indian Veterinary Association

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and Science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the *Journal* both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of ours should begin to rise higher and higher. On the success

or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.
Jai Hind!

T. VINAYAKA MUDALIAR,
Editor, *The Indian Veterinary Journal*.

THE I. V. J. RESERVE FUND

LIST OF CONTRIBUTORS

	Rs. nP.
Amount acknowledged (October 1961 issue) ...	6,247.05
Dr. C. G. Bhasker, S. I. T. C., Madras, 4th instalment ...	25.00
Total ...	6,272.05

Cheques, money orders and all correspondence should be addressed to the Editor, *The Indian Veterinary Journal*, Madras-17.

Indian Science Congress

AN APPEAL

[The following circular letter was sent round by Dr. S. Datta recently, to all concerned. Considering the important nature of the request, we give due publicity to it and we in turn appeal to the profession to co-operate with Dr. S. Datta in full measure, so that no work of any significance would be missed through our own default. Editor, *I.V.J.*]

You may be aware that the Indian Science Congress will be celebrating its Golden Jubilee early in January 1963. Arrangements are being made to compile a publication on "Fifty years of Science in India" with emphasis on work done during the past 25 years. This report should be in the hands of the General Secretary of the Congress by April, 1962.

I have been asked to compile a report on the development of Veterinary Science and Animal Husbandry in India to be included in the above publication with the co-operation of the Scientists working in this field under the Central Government and in the States.

I shall be thankful if you kindly instruct your heads of divisions and other experts to prepare the necessary report on the progress and developments made in their own fields of specialisation during the years under review, with a complete list of publications relating thereto.

I make my request also to you in person for giving me a note from your own pen. Needless to say that due acknowledgment will be

made to each of the experts giving co-operation in this venture. It will be appreciated if you could kindly arrange for this report to reach me by the 15th of February 1962.

12/2, Old Ballygunge Second Lane,
Calcutta-19.
1st November 1961.

S. DATTA, D.Sc., (Edin.),
M.R.C.V.S., D.T.V.M., F.N.I.

Review

Animal Health Year Book 1960:—FAO—OIE. Food and Agricultural Organisation of the United Nations, Rome.

This fifth annual livestock diseases report contains valuable information about the incidence of bacterial, viral and parasitic diseases of livestock inclusive of bees and fishes in the different countries of the world. The literature is furnished in all the three world languages - English, French and Spanish. References to recent publications on certain diseases and statistical data on livestock populations and the number of Veterinarians in various countries are also furnished. Special contributions on Foot and Mouth disease, Contagious Bovine Pleuro-pneumonia, Veterinary Education, *Dermatobia hominis* and African Horse Sickness have enhanced the value of this publication. This year book will be very useful for ready reference about the incidence of important diseases of domestic animals in various parts of the world.

V. S. ALWAR.

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THE INDIAN VETERINARY JOURNAL

A New Year Resolve

The *Journal* is suffering from lack of a permanent abode. The management has asked the Government of Madras and the Corporation of Madras for free grant of a piece of land to put up a building. It is likely they may consider our request favourably. But we must be prepared with the necessary finance to start work immediately. It is the sacred duty of every Veterinarian in India to send in his contribution to the Reserve Fund immediately. Let us put our shoulders to the wheel and raise this monument which is bound to attract, in years to come, members of our profession both from within and without India. Let every one of us be worthy of this noble profession. Let it not be said that we as a profession have failed her, in her hour of need. Come then, come quick, with your contribution and let us house this national *Journal* of ours in an abode of its own, before the end of 1962. Let this be our New Year resolve. Let us take a pledge to achieve this object before the new year is out.

We intend publishing a consolidated list of all contributors as a supplement to the *I.V.J.* in suitable time or as a special number with photos of all those who pay Rs. 100/- and above. May God help us in our attempt!

G. Vinayaka Murthy

President, Indian Veterinary Association
and
Editor, Indian Veterinary Journal.

MADRAS, }
10-11-61.

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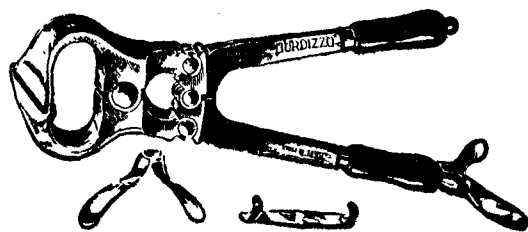
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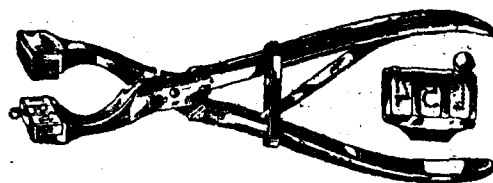
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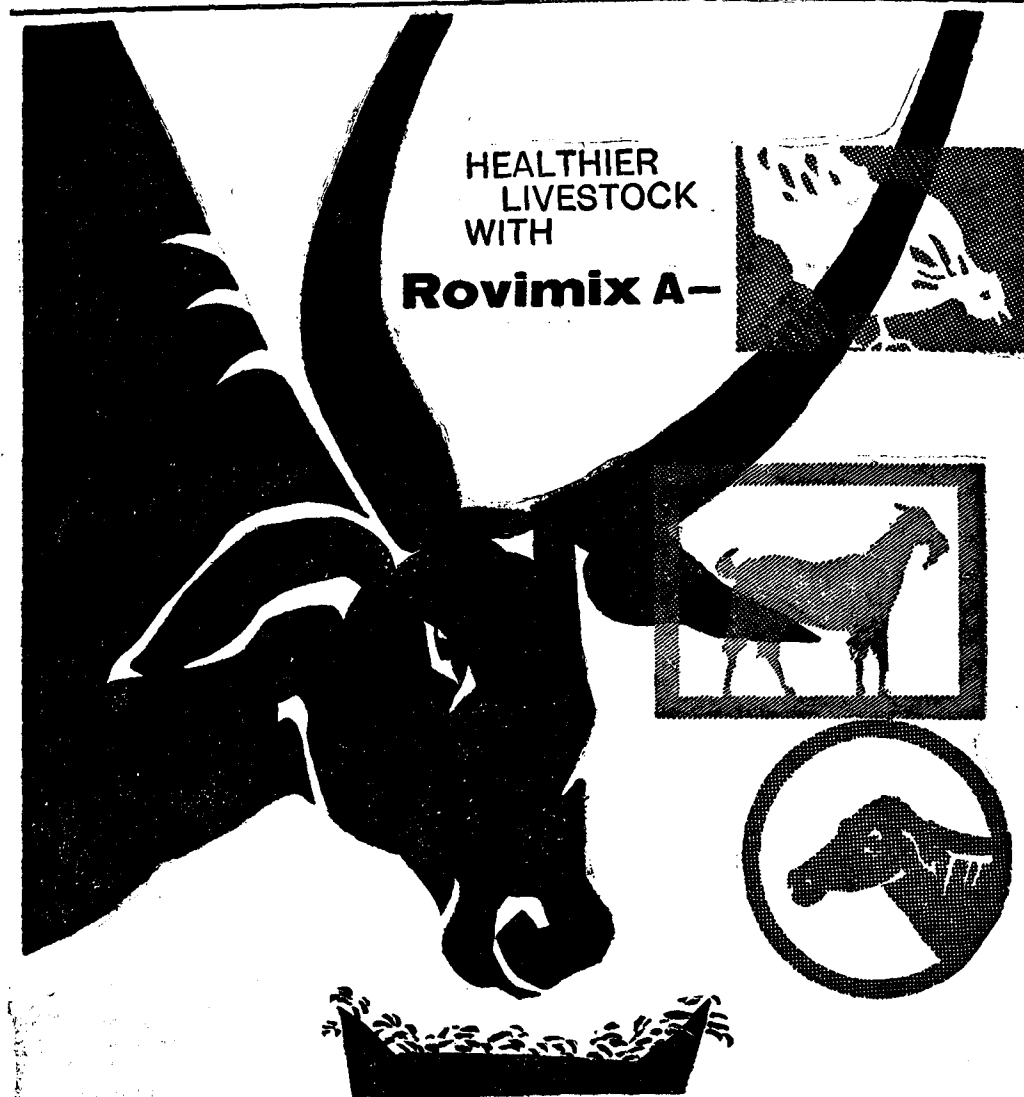
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