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EFFECT OF IVERMECTIN ON REPRODUCTION OF EWE

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SUMMARY

This work was carried out on healthy productive Sudanese desert sheep using ivermectin (1% Ivomec) at the therapeutic single dose of Icc/50 kg body weight (200 µgm/kgm body weight) on nonpregnant animals. Ewes were synchronized by the double synchronization technique using progesterone and prostaglandin F2α. The detection of oestrus cycle was realized through the physiological and Kunand ram methods. Ivemectin was administered in two sets of experiments, one day and 8 days before ovulation of the second oestrus cycle. Plasma samples were collected everyday on three consecutive oestrus cycles. Progesterone was assayed by RIA technique Clear elevation of the hormone levels were demonstrated when the concentration of the drug was at its maximum which was obtained when the drug was administered one day before ovulation. No effect was observed when the drug was administered at the hormone decline phase. Our studies demonstrated that Ivermectin improved the reproductive performance of ewes as ovulation occurred at maximum concentration of the drug.

KEYWORDS: RIA technique, oestrus cycles, Ivemectin.

INTRODUCTION

Ivermectin is a macrocyclic lactone and a mixture of two homologous compounds Ivermectin B_{1a} and B_{1b}. It is a broad spectrum anthelmintic used against ecto-and endo- parasites of fann animals (Campbell 1985).

In sheep it conferred high efficacy against gastrointestinal nematodes, lung worms and other parasites (Dakkak, et. al. 1986). Sheep is a highly prized animal; its meat is much relished and it is very easy to market; it allows the farmer to meet unexpected expenditure quickly (Charray , Humbert and leif, 1989) {Its raising has social role which takes many forms as performing some religious rites, in Muslim ceremonies, in marriage feasts, slaughtered to honour a respected visitor or parent.}.

In recent history sheep played an important role following the draught of 1984 which struck hardly on livestock, general, but restocking was achieved through this species by its quick increase in numbers due to short reproductive cycle (Charry et aL, 1989). Nowadays, sheep raising is shifting from the traditional pastoral methods of breeding towards extensive production for the market.

MATERIAL AND METHODS

Materials

Animals

Fifteen clinically healthy non-pregnant Sudanese desert ewes 2- 3.5 yrs old, weighing 30-40 kg were used. Blood was collected by veni- puncture for biochemical determination and complete haemogram. Those animals were free from ecto-and endoparasites. A 2-yr old healthy ram was also included in the experiment.

Test compounds were:

a. Ivermectin (Ivomec (1.0% w/v); sterile solution; M.S.D.; Haarlem Netherlands).
b. Prostaglandin F2α (PG F2α) estrumate (synthetic prostaglandin containing 265 pg cloprostenol sodium (Cooper Gm bH, Germany).
c. Synthetic progesterone (chronojest) flugestone acetate (Intervet, Holland).

Methods

Pregnancy diagnosis

This was done by abdominal palpation (Rechardson method, 1972) and plasma progesterone method (IAEA). The selected animals were kept in 4 separate pens, 6 square meters and fed on a diet composed of green Sudanese grass and cotton seed cake concentrate offered morning and evening. Water was allowed ad libidum.

Blood samples

Blood samples were collected from 8 ewes daily, in heparinzed vacutainer tubes, during the first, second and third oestrus cycle. The tubes were centrifuged at approx. 2000 r.p.m. for 15- 20 minutes and plasma collected within 4 hrs to minimize enzymatic degradation of progesterone. it was then transferred to new tubes and kept frozen at - 4^{o} C until analyzed. The first oestrus was considered as control, the second for immediate effect of the drug on the hormone levels and the third oestrus allowed the determination of the residual effect of the drug.

RESULT AND DISCUSSION

Table (1) and table (2) showed the individual values of progesterone levels following administration of ivermectin one day and 8 days before ovulation of the second oestrus respectively.

Figure (1) represented the effect of ivermectin on progesterone levels during three consecutive oestrus cycles, where ivermectin was administered one day before ovulation of the second oestrus whereas figure (2) represented the effect of ivermectin on progesterone levels when administered 8 days before ovulation of the second oestrus cycle.

Progesterone was recognized as the main regulatory hormone which controls the oestrus cycle in sheep (Karsh et al., 1978).

Blood concentrations of progesterone were revealed to be significantly higher during multiple pregnancies (Basset et al., 1969).

The maximum progesterone concentrations in the peripheral blood of ewes bearing a single, twins and triplets, was increased as the number of lambs increased (Emady et al., 1974). According to these findings, progesterone blood levels, would be a reliable mark of superovulation (Oedipe, 1994, Dinar, 1994).

In figure (1), the effect of ivermectin on progesterone levels was shown, during three consective oestrus cycles, when the drug was administered one day before ovulation of the second oestrus, clear elevation of the hormone levels was observed during the second oestrus cycle, hence, we could suggest that the drug induced a visibley noticed effect at the time when this drug was at its maximum blood concentration.

On the basis of these findings, figure (2), showed the effect of ivermectin on progesterone levels, during three consecutive oestrus cycles, when the drug was administered eight days before ovulation of the second oestrus.

Analysis of figure (2)indicated that change in progesterone levels could be revealed during the three oestrus cycles.

The three curves were judged to be approximately the same. This phenomenon would most probably be due to the fact that ovulation could have •happened during the decline phase (elemination) of the drug, with no visible effect on the hormone levels.

If we compare our finding with those reported in literature, we could conclude, that when the ivermectin was administered one day before ovulation; the latter would take place when the drug would be at its maximum concentration. The result was translated by an elevation in progesterone blood levels during the oestrus cycle. This could definitely be an indication of the drug effects on reproduction.

Hence, there are definitely good reasons to believe that ivermectin would be a major factor in improving reproductive performance in sheep.

Table 1.

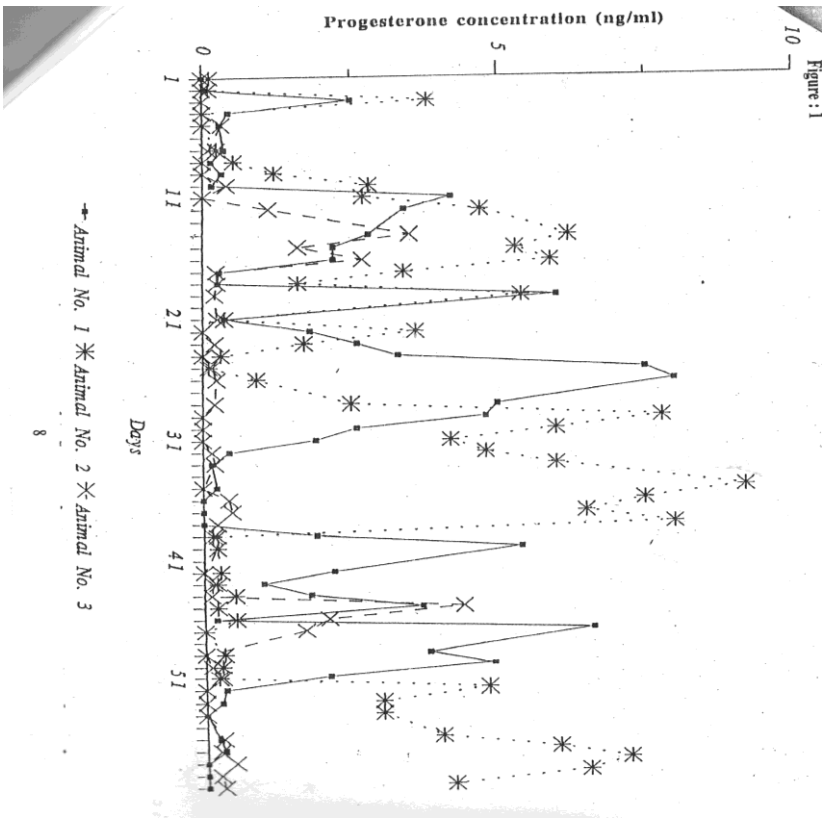
Day	**Progesterone Concentration ng/ml**			**Day**	**Progesterone Concentration ng/ml**		
	Animal No.				**Animal No.**		
	1	2	3		1	2	3
1	**0**	**0.13**	**0**	**31**	**1.9**	4.2	0
2	**0.05**	**0.11**	**0**	**32**	**0.44**	**4.8**	**0.15**
3	*2.5*	3.8	0	33	0.15	6	0.2
4	0.44	0	0	34			
5	0.29	0	0.32	35	0.23	9.2	0
6				36	0	7.5	0.43
7	0.36	0.24	0.1	37	0	*6.5*	0.48
8	0.14	0.52	0	38	0	8	0.23
9	0.32	1.2	0	39	1.19	0.15	0.22
10	0.15	2.8	0.4	40	5.4	0.23	0.22
11	4.2	2.7	0	41			
12	3.4	4.7	1.1	42	2.2	0.28	0
13				43	1	0.22	0.15
14	2.8	6.2	3.5	44	1.8	0.52	0.12
15	2.2	5.3	1.6	45	3.7	0.22	4.4
16	2.2	5.9	2.7	46	0.2	0.53	2.1

17	0.28	3.4	0.23	47	6.6	0	1.7
18	0.25	1.6	0.24	48			
19	6	5.4	0.2	49	3.8	0.32	0
20				50	4.9	0.28	0.1
21	0.36	0.36	0.24	51	2.1	0.22	0.28
22	1.8	3.6	0	52	0.34	4.8	0
23	2.6	1.7	0.2	53	0.27	3	0
24	3.3	0.3	0	54	0	3	0
25	7.5	0.1	0.15	55			
26	8	0.9	0.23	56	0.21	4	0.28
27				57	0.3	6	0.23
28	5	2.5	0.2	58	0	7.2	0.48
29	4.8	7.8	0	59	0	6.5	0.22 0.28
30	2.6	6	0	60	0	4.2	

Table 2.

Day	**Progesterone Concentration ng/ml**			**Day**	**Progesterone Concentration ng/ml**		
	Animal No.				**Animal No.**		
	1	2	3		1	2	3
1	**0.64**	0.4	1.2	31	10.5	10.3	9.2
2	**0.34**	**0**	1.1	**8**	**11**	**8**	**0.15**
3	**0.15**	**0**	*0.54*	33	8	8.1	9.8
4	0	0	0.09	34			
5	0.34	0.34	0.48	*35*	1.6	9.2	9.2
6				36	9.6	12.5	6.1
7	0.14	0.23	2.1	37	12	12	1.2
8	0.27	1.7	3.4	38	11	*5.5*	1.6
9	1.7	13	*7.5*	39	11.8	8.1	0.27
10	4.1	10.5	7.9	40	9.7	0.22	0.34
11	11	12	6.1	41			
12	9.2	9.2	10.3	42	14.5	0.27	0.27
13				43	13	0.46	1.1
14	8.4	8.4	9.2	44	10.5	1.9	1.25
15	10	14	11.5	45	10.7	1.9	2.2
16	8.8	10.9	8.5	46	12	3.4	4.4
17	8	11.5	4.7	47	11	6.8	4.4
18	7	8.5	1.5	48			
19	1.4	6	0.58	49	10.5	7.7	7.5
20				50	11.5	8.1	10.5
21	1.8	1.6	4.1	51	14	10.9	9.2
22	1.7	1.95	0.24	52	10.5	15	10.2
23	1.8	0	0.1	53	12	12.6	9.2
24	3	0.1	0.75	54	9	12.5	7.9
25	0	0.87	2.4	55			
26	0.22	3.9	4	56	5.5	7.2	10.4
27				57	1.9	0.22	7.9
28	6.7	7.7	4	58	0.27	0.27	9.8

29	8	5	6	59	0	0	4.1
30	8.2	7.2	8	60	0.1	3.4	1.7



CONCLUSION

Ivermectin which is ideally used in the treatment of parasitic infections in Sudanese Sheep, could play a role in the improvement of reprocuctive performance, through inducement of an increase in progesterone levels during the oestrus cycle. This increase had been reported to be a marked indicator of super ovulations at this phase (Oedipe, 1994; Dinar, 1994; Bussett et at. 1969). The induced effect on progesterone levels was clearly demonstratcd, since the blood concentrations of the drug were at their maximum levels during the superovulation phase.

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