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RESEARCH NOTE

VITAMIN A-D-E INJECTION OF PREGNANT BEEF COWS ON RESTED WINTER GRAZING

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The importance of sufficient vitamin A in the diet of cattle has been adequately substantiated (Rosenberger, 1970; Bauernfeind & Marusich, 1971; Thompson 1975; Lotthammer, 1978). It has been claimed that under semi-arid conditions (winter range) where no green pasture is available, it is important for animals to store sufficient vitamin A so as to carry them through to the summer when adequate intakes of carotene again become possible. In South Africa vitamin A supplementation is recommended widely and used extensively in practice, both by farmers and by the feed industry. This situation prevails despite the fact that in this country there appears to be no conclusive evidence indicating that such supplements hold any benefit in terms of animal performance.

Myburgh (1935, 1940, 1941) found that a vitamin A deficiency may exist under ranching conditions during the dry periods of certain seasons, while Joubert (1952) observed that cattle on natural grass-veld developed visible symptoms of a vitamin A deficiency during late winter. In contrast, Reyneke, Joubert, Claassen & Irwin (1963) and Skinner (1963) could not demonstrate a beneficial effect in terms of body mass of cows. Similarly, when beef cows were injected with vitamin A during the dry arid winter months Skinner (1963) found no increase in birth and weaning mass of calves nor a decrease in the incidence of retention of the after birth. Furthermore, vitamin A injections had no measurable effect on feedlot gains in beef cattle (Kargaard & van Niekerk, 1980).

This study was conducted in order to determine whether pregnant beef cows maintained on natural winter grassland would show a reduced live mass loss and a decreased incidence of retained after birth when injected with vitamin A and whether the live mass gains of the calves could be increased by this treatment.

During early June 1973, 22 pregnant Drakensberger cows were randomly allocated to 2 treatments. The cows from Group 1 received an intramuscular injection (1,5 ml) of vitamin A-D-E (Datons, Arachis oil B.P. preparation). Six weeks later the same cows received a second injection of vitamin A-D-E (1,5 ml), representing a total medication of 1,5 million IU vitamin A, 224 000 IU vitamin D_3 and 150 IU vitamin E. The animals in Group 2 served as Controls.

The cows from both groups were maintained as a single herd and were allowed to graze rested winter range for the full duration of the winter. All the animals had access to a NPN-mineral lick during this time and a mineral-salt lick was offered during summer. The NPN-lick consisted of 31% salt, 33% yellow maize meal, 21% bone meal and 15% urea (average intake 385 g/cow/day) while during summer the lick consisted of 2 parts bone meal to 1 part salt. Normal dry winter conditions followed a summer of slightly below average rainfall. Approximately 2 weeks prior to the start of the calving season (commencing September), all the cows were supplemented with approximately 8 kg of average quality *Eragrostis curvula* hay per day. The birth mass of heifers was adjusted to a bull equivalent (birth mass x 1,048) and the weaning mass was converted to a 205-day steer equivalent by multiplying the age adjusted mass of heifers by 1,05 (Rush & Totusek, 1976).

Although live mass loss is one of the primary effects of winter nutritional depression, the results in Table 1 demonstrate that injection of pregnant cows with vitamin A-D-E did not decrease body mass loss over the experimental period and also had no effect on the birth and weaning mass of the calves. In fact, a non-significant negative response was recorded for all the parameters measured, (Table 1). None of the cows in this trial had retained plancentas.

Although many cases have been reported of no benefit as regards gain in body mass following vitamin A supplementation (Ross & Knodt, 1948; Reyneke, et al., 1963; Skinner, 1963), no evidence of field studies is available to confirm the negative trend as recorded in this experiment. Thompson (1975) did however report toxic effects when large oral doses of retinol (10560 IU vitamin A per kg live mass) were administered to calves.

Since many factors influence the utilization of vitamin A, a safety factor of five- to ten-fold the minimum require-

Table 1

Change in body mass of the cows, sex corrected birth and weaning masses of the calves and reconception rate for cows supplemented with vitamin A-D-E

	Treatments		
	Vitamin A-D-E	Control	P
No. of cows	10*	11	
Average body mass of cows (kg):			
Start of experiment	465,8 ± 54,1	460,8 ± 61,6	NS
Start of bulling season	404,1 ± 54,0	426,2 ± 60,0	NS
Average difference in body mass (kg/cow)	–61,7	–34,6	NS
Sex corrected body masses of calves (kg):			
Birth	37,0 ± 5,1	37,8 ± 3,8	NS
205-day corrected weaning mass	195,2 ± 25,3	201,8 ± 19,0	NS
Average reconception (%)	70,0	81,8	NS

* One cow aborted and was eliminated

ment is built in where recommended requirements for cattle have been calculated (Thompson, 1975). For example, NRC (1976) states that an intramuscular injection of emulsified vitamin A at the rate of 1 million IU should provide sufficient vitamin A to prevent deficiency signs for 2 - 4 months. The vitamin A level applied in this study could thus not be regarded as excessively high and should not have depressed the body mass gains.

Unpublished tests conducted by Roche (Pty) Ltd indicate that cattle in the Dundee area have abnormally low β -carotene plasma levels during the dry season. It would appear therefore, that β -carotene *per se* rather than vitamin A may be an important factor involved in reproductive problems such as retained after births and reduced body mass losses during winter.

No published evidence could be found regarding toxicity levels for vitamins D and E when administered by injection. Furthermore, since vitamin D is of no known practical significance under South African conditions and vitamin E serves essentially as a preservative for vitamin A these 2 vitamins can probably be ignored.

Although these results are in accordance with the majority of the work conducted in this country with vitamin A supplementation, the tendency for vitamin A-D-E treatment to increase mass loss, was contrary to expectation. Furthermore, there seems to be no justification to attempt to reduce live mass loss by injecting cows with vitamin A during short carotene deficient periods since liver reserves of this vitamin appear to be adequate.

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