ZERANOL IMPLANTATION FOR SUCKLING RAM LAMBS WEIGHT GAIN AND DEVELOPMENT OF THE REPRODUCTIVE TRACT

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Twenty intact ram lambs of mixed breeding and 20 to 35 days of age were distributed, within weight classes, to two treatment groups: implanted with 12 mg of zeranol or non-implanted controls. All lambs remained with their dams on pasture during the 109 day experimental period with individual weights taken at 14 day intervals. At the end of the experiment all lambs were slaughtered Reproductive organs were collected weighted separately and microscope slides prepared from testicular tissue and the vas deferens . Mean lamb weights did not differ significantly between treatment groups at any weight period; however, tendencies toward the end of the trial favored zeranol-treated lambs. Overall weight gains showed 20.5% advantage for implanted lambs (P = .10) with greatest differences noted toward the end of the trial (P<0.05) Zeranol lambs had significantly lighter testicles at slaughter (P<0.05), while epididyn:es, seminal vesicles and Cowper's glands did not differ between treatment groups. Seminiferous tubule diameters and nuclei counts in tubule cross-section were not affected by treatment while a highly significant (P<0.01) increase in vas deferens diameter was observed for zeranol-treated lambs.

Key words: Lambs, zeranol, reproductive tract

In recent years attempts have been made to find alternatives to growth stimulating hormones such as diethylstilbestrol. One of the non-hormonal anabolic agents which have recently been approved for use as implants in several countries in the Americas is zeranol (6-(6, 1C-dihydroxyundecyl)β-resorcylic acid μ-2lactone), which is marketed under the commercial brand-name of Ralgro[2].

In a review on the subject of zeranol implantation for ruminants, Hall (1977) analysed the effect of the anabolic agent by species, sex, age and feeding regime. It was apparent that zeranol gave an average improvement over controls of 13% for weight gain and 9% for feed conversion. Feeding regime was more important than species or sex as a determinant of relative advantage for zeranol implantation in ruminants Animals subjected to high roughage feeds gave proportionately greater responses to zeranol implantation than those maintained under more high energy feeding regimes. Although results varied widely according to the specific conditions of the particular experiment, younger animals during active growing periods, tended to respond more favorably than older animals approaching the finishing stage.

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Animals implanted at very young ages did not usually respond as favorably to zeranol implants as those implanted post-weaning. VanderWal et al (1975), working with dairy calves weaned at 5 days of age and given high quality diets, observed an average advantage for zeranol in 10 trials of only 3.7%. Similarly, Nelson & Kelly (1972) noted a 3.4% advantage for the implant with carry calves weaned al birth. These results may be compared with those reported for animals weaned at conventional ages for which relative advantages for zeranol implantation at that time were ranged from 23 to 27% (Nicholson et al 1974; Utley et al 1975, 1976. In his review, Hall (1977) has attributed the differential response obtained during the suckling stage and that observed post-weaning as being partially due to the higher quality diets normally fed suckling lambs and calves (high quality milk replacers and starters and/or milk). Feeding regime of dams would thus presumably be important for animals implanted while suckling.

Limited research with intact male ruminants implanted with zeranol shows that the anabolic agent is possibly deleterious to the development of the reproductive tract. Beeler et al (1973) noted that testicle, epididymis and seminal vesicle weights were reduced, as were the diameters of seminiferous and epididymal tubes, for lambs implanted at 44 or 89 days of age. Wiggins et al (1976) observed decreased testicle weights and histological alternations in the urogenital tracts of zeranol-treated lambs.

This study was conducted at the Federal University of Santa Maria, in southern Brazil, in an attempt to measure the response to zeranol of suckling ram lambs raised with their dams under typical limiting pasture conditions, and to measure the effects of the implant upon gross development and histological characteristics of selected parts of their reproductive tracts.

Materials and Methods

Twenty intact ram lambs of between 20 and 35 days of age, of Polwarth or mixed breeding, were stratified by weight and then randomly distributed within weight classes to two treatment groups. The first group of 10 lambs were each implanted with one 12 mg pellet of zeranol in the left ear and the remaining 10 served as controls. All lambs were identified by numbered plastic tags.

All lambs were run together, with their dams, on annual ryegrass (Lolium multiflorum) pasture from birth until approximately 60 days of age (late October). At this time the flock was placed on native grass pasture, where the animals remained until the termination of the trial in late December. The flock received no supplementation during the experiment. The native grass pasture typical to the area has been described by Hall et al (1975) and consists primarily of perennial low-growing summer grasses generally considered of medium to low crude protein content and dry matter digestibility, and quite limiting in phosphorus content.

The lambs were weighed at 14 day intervals and slaughtered on conclusion of the experiment The genital tracts were carefully removed upon dressing the carcasses,

and later separated into testicles, epididymis, vas deferens, seminal vesicles and Cowper's (bulbourethral) glands and weighed to the nearest 0.1 g (testes and epididymis) or 0.001 g (remaining parts).

Approximate one-gram samples of testicular tissue from each lamb were prepared by standard methods for the elaboration of slides. Eight cross sectional presentations of seminiferous tubules were chosen at random, and mean diameters as well as mean nuclei counts taken. Similarly, a section of the vas deferens immediately distal to the sigmoidal flexure was prepared into slides, and eight cross-sections measured per lamb. Student's "t" test was applied to all parameters as a measure of significance.

Results and Discussion

Mean weights and weight gains of implanted and control lambs, are presented in Table 1. Weights did not differ significantly at any of the bi-weekly weigh dates. However, overall gains showed a 20.5% advantage for implanted lambs, a difference which approached significance (P = .10) Weight gains during the final 39 days of the trial differed significantly (P <0.05), while treatment differences were negligible during the first 70 days of the experiment. It is possible that adequate ewe milk production was ensured while they were on ryegrass (first 60 days) and that lambs also benefited directly from this pasture. In contrast the latter part of the experiment was characterized by poorer quality pasture at a time when the lambs would need to rely more on dry feed and less on dwindling milk production from the ewes. This may account for late onset of the Zeranol effect upon lamb growth. Small or negligible advantages for zeranol-treated calves during the suckling stage have already been cited (Nelson & Kelly 1972; VanderWall et al 1975) and attributed to the typically high-quality diets received (Hall 1977).

Table 1:
Mean weights and total weight gains (kg) of ram lambs with or without zeranol implants

	Live weight				Total weight gains		
Treatment	Sep. 12	Nov 21	Dec 19	Dec 30	First 70	Last 39	Overall
Implanted	10.19	19.49	18.66	22.31	9.30	2.32	12.12
Control	10.60	20.21	17.99	20.66	9.61	0.45	10.06
Zeranol advantage (%)	-3.9	-3.6	3.7	8.0	23.2	415.6*	20.5

* P <0.05

Table 2:
Mean weights of selected genital tissues of zeranol implanted and control lambs

Treatment	Testicles (g)	Epididymis (g)	Seminal vesicles (mg)	Cowper's glands (mg)
Implanted (I)	21.78	6.42	1846	784
Control ©	26.28	5.85	1065	406
Difference (I-C)	-4.50 *	0.57	781	378

* $P < 0.05$

Table 2 shows mean weights of selected genital tissues of implanted and control lambs, obtained upon slaughter on December 30 . The testicle weights of implanted lambs were significantly lighter than those of controls ($P < 0.05$). Other tissues varied widely in weight among treatments, with a tendency for seminal vesicles and bulbourethral glands of implanted animals to be heavier.

The negative effect of zeranol upon testicle weight has been reported by Beeler et al (1973) and Wiggins et al (1975). The former workers also noted weight reductions in epididymal and vesicle weights for implanted animals. Wiggins et al (1976) did not observe any implantation effect upon on seminal vesicle weight.

Table 3 shows the results of microscopic evaluations made of testicular tissue and the vas deferens of implanted and control lambs. Mean diameter of the seminiferous tubule or number of nuclei per tubule measured did not vary between treatments. However, a highly significant ($P < 0.01$) treatment effect was observed regarding mean vas deferens diameters; larger diameters being obtained with implanted animals.

Beeler et al (1973) observed that zeranol-treated lambs had reduced seminiferous and epididymal tube diameters. While data regarding the effect of zeranol upon the diameter of the vas deferens were not found in the literature, a similar reduction to that documented for seminiferous and epididymal tubes would presumably be expected in the case of the vas deferens. The authors have no explanation for the significantly larger vas deferens of implanted lambs obtained in this trial. Based upon the results of this particular trial it may be concluded that suckling lambs will respond favorably to zeranol toward the end of the suckling stage. Further evidence is provided to support the theory that feeding regime plays an important part in determining response to zeranol, and to substantiate the results of limited work showing a deleterious (or, at least, differential) effect of zeranol upon the reproductive organs of growing male ruminants. Based on these results, zeranol is not recommended for intact males destined for reproduction.

Table 3:
Effect of zeranol upon diameter of seminferous tubule and vas deferens and number of number nuclei in tubule cross-sections

Treatment	Diameter of seminiferous tubule (m)	Number of nuclei in seminiferous tubule cross-section	Diameter of vas deferens (mm.)
Implanted (I)	62.20	85.10	3.09
Control ©	61.93	83.74	2.38
Difference (I-C)	0.27	1.30	0.71**

**P< 0.01

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