Effects of active immunization against androstenedione on the reproductive performance of Merino ewes

J.P.C. Greyling

Animal and Dairy Science Research Institute, Private Bag X2, Irene 1675, Republic of South Africa

Received 28 July 1988; accepted 30 November 1988

The effect of active immunization against the ovarian steroid, androstenedione, on the reproductive performance of Merino ewes was investigated. Although a significant ($P<0,01$) increase of 19% in fecundity and 20,3% in lambing rate was obtained by treatment, the eventual number of lambs weaned as a percentage of the number of ewes lambed did not differ significantly from the control group, implying greater ($P<0,01$) lamb mortalities in ewes that were immunized. The practical application of immunization against ovarian steroids to improve reproductive efficiency in sheep requires further investigation and at this stage it would seem that survival of the lambs is the issue to address.

Die invloed van aktiewe immunisasie teen die ovariasteroïede, androsteendioon, op reproduksieprestasies in Merino-ooie is ondersoek. Alhoewel 'n betekenisvolle ($P<0,01$) verhoging van 19% in fekunditeit en 20,3% in lampersentasie verkry is deur behandeling, was die uiteindelike aantal lammers gespeen as 'n persentasie van die ooie wat gelam het, nie betekenisvol verskillend van die kontrolegroep nie. Dit impliseer groter ($P<0,01$) lammortaliteite in die geïmmuniseerde ooie. Die praktiese gebruik van die immunisasietegniek teen ovariasteroïede om reproduksiedoeltreffendheid in skape te verhoog, verg nog aandag.

Keywords: Androstenedione, Merino ewes, reproductive performance, steroid immunization

One of the principal functions of feedback between the hypothalamus, pituitary gland and ovaries is to ensure regular ovulation. Changes in this feedback system e.g. immunization against androgens, may interfere with ovarian function and alter the ovulation rate of sheep (Martin, Scaramuzzi, Cox & Gherardi, 1979; Scaramuzzi, Baird, Clarke, Martensz & Van Look, 1980). Sheep immunized against androstenedione, show increases in ovulation rate, and the changes produced in the hypothalamic–pituitary–ovarian feedback imply androstenedione as an active regulator of this ovarian feedback system (Van Look, Clarke, Davidson & Scaramuzzi, 1978; Martensz & Scaramuzzi, 1979).

The importance of increased rates of ovulation cannot be overemphasized and, given that management and nutrition are adequate, the potential for application of this technique in sheep is vast. Initial trials suggested that increases in lambing percentages may be expected in all breeds, but that Merinos tended to show the least response to immunization against androstenedione. These CSIRO field trials indicated that androstenedione immunization treatment in sheep increased ovulation rates by between 18 and 45% and the percentage lambs born rose by 10 to 30% (Technical Bulletin, 1983). This trial was thus undertaken to investigate the effect of active immunization against androstenedione on the subsequent reproductive performance of Merino ewes under range conditions.

A flock of 350 multiparous Merino ewes was randomly allocated to two groups during the active breeding season (April). The first group of 200 ewes was initially immunized against androstenedione, conjugated to human serum albumin (Fecundin–Coopers) at 5 weeks prior to the onset of the mating period, followed by a booster injection 3 weeks later. The dose of Fecundin (2 ml sol. containing 0,6 mg/ml Polyandroalbumin) was administered *via* the subcutaneous route. The second group (non-treated) of 150 ewes served as a control.

Fertile Merino rams (4%) were introduced into the flock for a mating period of 42 days. The reproductive performances of the respective groups subjected to the two treatments are summarized in Table 1 . The mean mass of all the ewes at the onset of the mating period was $49,5 \pm 1,2$ kg. From the results obtained, it appears that, although active immunization against androstenedione resulted in a significant ($P<0,01$) increase of 19% in fecundity and 20,3% in lambing rate, the eventual

Table 1 Effect of active immunization against androstenedione (Fecundin) on the reproductive performance of Merino ewes

Item	Control	Treated
Number of ewes	150	200
Number of ewes lambed	138	188
Percentage ewes lambed	92,0	94,0 NS[a]
Number of lambs born	175	274
Lambing percentage	116,7	137,0**
Fecundity	1,27	1,46**
Number of lambs weaned	152	207
Lambs weaned as % of lambs born	86,9	75,5**
Lambs weaned as % of ewes lambed	110,1	110,1 NS[a]
Losses at birth (%)	7,2	13,3 NS[a]

[a] No significant difference.
** $P<0,01$.

number of lambs weaned as a percentage of the number of ewes lambing (productive indicator) did not differ significantly between the treated and non-treated groups. The weaning phenomenon in the immunized group may be attributed to a higher mortality rate in the offspring at birth, owing to greater numbers of less viable lambs being born and leading to a reduction in the survival rate to weaning. It was noticable that the vast majority of afore-mentioned mortalities occurred in one of twin lambs. The percentage of the lambs which survived to weaning was significantly ($P<0,01$) higher in the control than in the treated group.

Practical feasibility of an immunization programme in ewes against androstenedione must be measured in terms of the cost implications and the eventual percentage of lambs weaned. From the results of this study, the use of immunization against ovarian steroids to improve reproductive efficiency remains to be justified and survival of the lambs is the issue that has to be addressed.

References

MARTENSZ, N.D. & SCARAMUZZI, R.J., 1979. Plasma concentrations of luteinizing hormone, follicle stimulating hormone and progesterone during the breeding season in ewes immunized against androstenedione or testosterone. *J. Endocr.* 61, 249.

MARTIN, G.B., SCARAMUZZI, R.J., COX, R.I. & GHERARDI, P.B., 1979. Effects of active immunization against androstenedione or oestrone, on oestrus, ovulation and lambing in Merino ewes. *Aust. J. Exp. agric. Anim. Husb.* 19, 673.

SCARAMUZZI, R.J., BAIRD, D.T., CLARKE, I.J., MARTENSZ, N.D. & VAN LOOK, P.F.A., 1980. Ovarian morphology and the concentration of steroids during the oestrous cycle of sheep actively immunized against androstenedione. *J. Reprod. Fert.* 58, 27.

TECHNICAL BULLETIN, 1983. Fecundin. Sheep fecundity improver. Cooper Animal Health.

VAN LOOK, P.F.A., CLARKE, I.J., DAVIDSON, W.G. & SCARAMUZZI, R.J., 1978. Ovulation and lambing rates in ewes actively immunized against androstenedione. *J. Reprod. Fert.* 53, 120.