

of first oestrus and ovulation rate (OR) after lambing in spring, using a factorial design 2 × 2 defined by two planes of nutrition, 1.5 (H) and 1 (L) times the maintenance requirements, and treatment (M) or not (C) with a single subcutaneous implant containing 18 mg melatonin (Melovine™). Forty-nine Spanish adult Salz ewes lambing in March and housed under natural daylength conditions at 42°40'N were used. Oestrus was tested daily by aproned rams and OR 6 days after positive identification. Melatonin was measured in five ewes of each group. Mean night and day values at day 34 after implant insertion were: 465.70 (s.e. 89.30) and 330.91 (s.e. 78.72) ng/l for M group and 135.40 (s.e. 24.35) and 6.77 (s.e. 0.57) ng/l for C group. The mean weaning to first oestrus interval was shorter in M than in C ewes: 50.83 (s.e. 4.24) v. 87.64 (s.e. 6.28) days ( $P < 0.01$ ). Considering together both implanted and non-implanted animals, the ratio between mean night and day time plasma melatonin concentrations was very significantly correlated with the delay of resumption of oestrous activity ( $r = 0.65$ ;  $n = 20$ ;  $P < 0.01$ ) after implant insertion. The OR was higher for M ewes in the second behavioural oestrus ( $P < 0.05$ ). An interaction between plane of nutrition and exogenous melatonin ( $P < 0.01$ ) in the second oestrus was detected, with mean values of 1.92 (s.e. 0.08), 2.00 (s.e. 0.00), 2.18 (s.e. 0.18) and 1.50 (s.e. 0.17) corpora lutea for treatments HM, HC, LM and LC respectively. This interaction was close to the significance in the first, fourth and fifth oestrus ( $P < 0.1$ ). These results suggest that exogenous melatonin may be an effective way of advancing the breeding season and enhancing OR associated with a moderately low level of nutrition.

#### 84. Pregnancy associated glycoprotein and progesterone concentrations in plasma of sheep during gestation and post-partum period

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This work was carried out with the aim of studying pregnancy-associated glycoprotein (PAG) and progesterone (P4) levels in serum of Churra and Merino ewes throughout gestation and the 1st month post partum. Fifteen Churra and 15 Merino ewes originated from a single flock were mated by entire rams of their respective breed after classical oestrus synchronization. Afterwards blood samples were taken weekly until 30 days after lambing. PAG and P4 levels were determined by radioimmunological assay. All ewes lambed after 148 (s.e. 0.55) days with a single lamb. PAG profiles were very similar in both breeds from weeks 1 to 18, with a peak at weeks 9 to 10. From week 18 to lambing, PAG concentrations increased rapidly in Churra ewes (from 250 to 650 µg/l) while PAG remained relatively constant in Merino ewes (around 250 µg/l). However, in both breeds, PAG levels decreased rapidly after lambing, reaching basal values below 4 µg/l at the 4th week. PAG concentrations during the last 3 weeks of gestation were higher in Churra ewes carrying a male foetus than in those carrying a female (345 v. 125, 408 v. 134 and 874 v. 151 µg/l at weeks 19, 20 and 21, respectively). Similar results were also found for Merino ewes (402 v. 185, 373 v. 198 and 356 v. 220 µg/l at weeks 19, 20 and 21, respectively). No relationship was found between PAG levels and lamb birth weight. In both breeds, P4 increased throughout the whole length of gestation with the highest level measured at weeks 19 to 20 (around 12 µg/l) and declined 1 week before lambing. Differences in P4 concentrations between breeds were not significant ( $P > 0.05$ ). No correlation was found between P4 and PAG concentrations in plasma throughout gestation. These results indicate that breed of sheep and sex of foetus could influence the PAG production or PAG release in maternal blood.

#### 85. Comparison of MOET in Texel ewe lambs and yearling ewes

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The use of multiple ovulation and embryo transfer (MOET) in breed improvement with young ewes is likely limited by low embryo quality and survival. In November 1992, MOET was evaluated in groups of nine and 11 8-month-old ewe lambs (groups A and B) and seven 20-month-old ewes (group C). Oestrus was synchronized using 45 mg cronolone intravaginal pessaries (Chronogest, Intervet Laboratories Ltd) which were renewed on day 7 and withdrawn on day 12. Superovulation was achieved using ovine FSH (Ovagen, Immuno-Chemical Products) in eight doses of 1.0 ml (ewe lambs) and 1.25 ml (ewes) at 12-h intervals starting 58 h (group A) and 64 h (groups B and C) before pessary withdrawal. PMSG was given at 0, 300 and 400 i.u. 48 h before pessary withdrawal for groups A, B and C respectively. Prostaglandin F2α (0.5 ml Estrumate, Coopers Animal Health Ltd) was given with the first injection of Ovagen. Intrauterine insemination using fresh semen took place 38 h (groups A and C) and 24 h (group B) after pessary withdrawal and laparoscopic recovery of embryos was conducted 6 days later. High grade embryos were transferred by laparoscopy to 3-year-old Texel cross ewes. Mean ovulation rates were 7.1 (s.e. 5.35), 13.5 (s.e. 6.5) and 13.3 (s.e. 6.7) ( $P < 0.01$ ), embryos recovered per donor were 4.0 (s.e. 4.3), 4.8 (s.e. 4.4) and 6.0 (s.e. 3.5) ( $P > 0.05$ ) with 73%, 69% and 81% ( $P > 0.05$ ) high grade embryos and embryo survival rates of 63%, 76% and 72% ( $P > 0.05$ ) for groups A, B and C respectively. Embryo recovery rates were lower than in previous studies in this flock. Ewe lamb embryo quality and survival was satisfactory, indicating some potential for breeding applications of MOET.

#### 86. Influence of age of donor ewe on MOET in Texel sheep

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Multiple ovulation and embryo transfer (MOET) from superior ewes offers the opportunity to increase rates of genetic improvement in sheep breeding schemes. Greatest impact is likely when MOET is applied to younger ewes, as a result of shortened generation interval. In October 1991, a group of 20 18-month-old ewes (gimmers) and 20 aged ewes (3.5 years old) underwent oestrus synchronization using intravaginal pessaries containing 45 mg cronolone (Chronogest, Intervet Laboratories Ltd) inserted for 12 days. Eight injections of ovine FSH (1.25 ml Ovagen, Immuno-Chemical Products) at 12-h intervals were used to stimulate superovulation, the first injection being given 58 h before the end of progestagen treatment. Prostaglandin F2α (0.5 ml Estrumate, Coopers Animal Health Ltd) was given in conjunction with the first injection of Ovagen and 200 i.u. PMSG were given with the third. Laparoscopic artificial insemination was carried out using fresh semen 46 h after the end of progestagen treatment and laparoscopic recovery of embryos took place 6 days later. Viable embryos were transferred to 2-year-old Texel cross ewes. Mean ovulation rates of 10.0 (s.e. 3.7) and 10.6 (s.e. 6.6), recovery rates of 6.4 (s.e. 4.5) and 7.2 (s.e. 5.9), transfer rates of 5.1 (s.e. 4.8) and 5.9 (s.e. 6.0) and embryo survival rates of 59% and 74% were achieved for young and aged ewes respectively. The age of ewe effect was non-significant ( $P > 0.05$ ). Further work is needed to overcome the wide variation in response seen between donors.

#### 87. Multiple ovulation and embryo transfer in hill ewes: effects of mating system on embryo quality, and its relationship with pregnancy rates

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