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– *Progesterone levels as an indicator of reproductive success in young ewes*

## Progesterone levels as an indicator of reproductive success in young ewes

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Joining ewes to lamb at 1 year of age is characterised by highly variable fertility rates, with the underlying causes not yet fully understood (Fogarty *et al.* 2007). The attainment of sexual maturity could be a predictor of early reproductive success in ewes, though little is known about this trait. We hypothesise that progesterone levels measured during joining are a useful indicator of sexual maturity attainment and are correlated with early reproductive outcomes.

Industry flocks provided lambing records from 3289 ewes of different breeds joined at 8 months of age on average. Progesterone concentrations in blood collected 14 days after male introduction (PROG, ng/ml) were determined via an enzyme-linked immunosorbent assay in a subset of 1888 ewes. Heritability and genetic correlations between PROG and yearling reproductive rate were determined from univariate and bivariate analysis using animal models in ASReml (Gilmour *et al.* 2009). Models fitted contemporary group (site/flock), birth type-rear type, dam age, sire-dam breed, measurement age and its quadratic, where significant ( $p < 0.05$ ). PROG contemporary groups also accounted for bleed date, assay date and plate effect.

Mean PROG was  $1.14 \pm 1.43$  ng/ml (Table). Since 1 ng/ml of progesterone has been suggested as a threshold for the attainment of sexual maturity in ewes this implies that there was a mix of pubertal and non-pubertal animals at time of blood sampling (Foster & Olster 1985). PROG was moderately heritable which is in agreement with other measures of ewe sexual maturity (Toe *et al.* 2000). Heritabilities of fertility (FERT), no. lambs born (NLB) and weaned (NLW) were low, as expected (Table). Both phenotypic and genetic correlations indicate that higher PROG levels are associated with improved reproductive outcomes. The magnitude of the standard errors of the genetic correlations limits the ability to draw firm conclusions from the results.

Table. Trait means, heritabilities (on the diagonal) and phenotypic (above) and genetic (below) correlations for blood progesterone levels (PROG), fertility (FERT), no. lambs born (NLB) and weaned (NLW).

	PROG	FERT	NLB	NLW
<b>Trait Means</b> (s.d)	1.14 (1.43)	0.50 (0.50)	0.73 (0.81)	0.55 (0.73)
<b>PROG</b> (s.e.)	<b>0.28 (0.07)</b>	0.15 (0.02)	0.12 (0.02)	0.06 (0.02)
<b>FERT</b> (s.e.)	0.26 (0.22)	<b>0.07 (0.03)</b>	0.87 (0.00)	0.71 (0.01)
<b>NLB</b> (s.e.)	0.28 (0.24)	0.91 (0.05)	<b>0.08 (0.03)</b>	0.82 (0.01)
<b>NLW</b> (s.e.)	0.14 (0.25)	0.92 (0.07)	0.98 (0.05)	<b>0.08 (0.03)</b>

To date genetic improvement of ewe reproductive performance has been limited by low heritabilities and low correlations with other production traits. PROG has a high heritability relative to other reproduction traits and is positively correlated with reproduction. PROG could be incorporated into selection indexes to increase gains in ewe reproduction, pending a cost-benefit analysis of the value of doing so. As hypothesised, progesterone levels measured during joining appear to be a useful indicator for reproductive success in young ewes.

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