

HERITABILITY OF OVULATION RATE AND LEVEL OF EMBRYONIC
LOSSES IN ROMANOV BREED

HERITABILITE DU TAUX D'OVULATION ET MORTALITE EMBRYONNAIRE
EN RACE ROMANOV

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In order to obtain a more efficient increase in prolificacy than that resulting from direct selection on that trait, an indirect selection on ovulation rate, by reducing the generation interval to the maximum and by using superovulation and ova transfer, may be practised (HANRAHAN, 1980; HANRAHAN and QUIRKE, 1980). However, the advantage of that solution depends on the genetic parameters of ovulation rate and litter size. The purpose of this study was to give a first estimation of the heritability of ovulation rate and of the embryonic losses rate in Romanov ewe-lambs and adult ewes belonging to an experimental herd.

I Animals and method

1. This study was made with 650 ewe-lambs and 590 ewes of the Romanov breed born from 1974 to 1981 at the "Domaine of Langlade" near Toulouse. Naturally, all the rams used belonged to "families" constituted in the "Domaine de la Sapinière" near Bourges with imported animals; they were partly selected on the prolificacy of their dams, and some of them were related.

The ewe-lambs were born in January-February. The average 1st oestrus date was September 8th. Endoscopies were performed from September to December according to years, but each year during a limited period of 20 days and only one time per animal. The ewe-lambs were mated (by Berrichon rams) during the first year, except from 1975 to 1977. Adults were mated by Romanov rams, late August- early September.

Further observations were made in 38 adult Romanov and 29 adult Finnish ewes in August 1977, as well as on 86 Romanov and 49 F1 (Lacune x Romanov) ewe-lambs in November 1980.

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TABLE 1 : DISTRIBUTION OF OVULATION RATE ON 650 EWE-LAMBS AND 567 ADULTS

		Ovulation rate (C.L.)							
Age	No	1	2	3	4	5	6	7	Average
8 - 10 months	650	2.2	49.3	44.2	3.8	0.5			2.51
1 to 2 years	341	0.9	5.9	63.0	26.7	3.2	0.3	-	3.26
2 to 3 years	158	-	6.3	56.3	30.4	5.7	0.6	0.6	3.40
3 to 5 years	68	-	1.5	52.9	32.3	13.2	-	-	3.57

ewe-lambs : 1974 to 1981 ; adults : 1975 to 1980

TABLE 2 : EMBRYONIC LOSSES ON EWE-LAMBS AND ADULTS, RELATED TO OVULATION RATE

	Ovulation rate (C.L.)			
	2	3	4	5
a) <u>ewes mated</u> (★)				
p.100 losses	14,9 (211)	19,0 (553)	26,1 (181)	24,5 (31)
litter size	1,70	2,43	2,96 [★]	3,77
b) <u>ewes lambing</u>				
p. 100 losses	6,0 (191)	12,5 (512)	18,0 (163)	19,3 (29)
litter size	1,88	2,62	3,28	4,00

(★) excludes returns to service

2. Endoscopies were made 5-10 days after mating (or oestrus) according to the method of THIMONIER and MAULEON (1969). The number of ovulations was estimated from the number of corpora lutea or adjusted to the number of lambs born if the latter exceeded the former (5-8% of the ewes). Losses were calculated in mated ewes and in pregnant ewes after 1st mating = number of ovulations minus litter size in p 100 of number of ovulations. We also calculated the litter size according to the number of ovulations.

3. Heritability of ovulation rate in ewe-lambs was calculated by hierarchical analysis - years, sires and years, sires, dams- to estimated sire variance and dam variance = 650 daughters and 48 sires.

II Results

1. Number of ovulations. Estimation of heritability in the ewe-lambs.

At the age of 8-10 months, the mean number of ovulations was 2.51 (table 1). The differences between years and between sires were highly significant. The sire variance was almost equal to the dam variance and heritability was 0.24. The ovulation rate increased with age from 3.26 to 3.57, from the 2nd to the 4th year.

2. Embryonic losses

- Romanov. The embryonic losses were not significantly different in ewe-lambs and adult ewes. The percentage of losses in the fertilized ewes was 6.0, 12.5 and 18.0 respectively with 2, 3 and 4 ovulations, so that the litter size increased by 0.74 and 0.66 when the ovulation rate increased from 2 to 3 and from 3 to 4. The losses in mated ewes were 14.9, 19.0 and 26.1%, respectively with 2, 3 and 4 ovulations (table 2).

- Romanov and Finnish ewes. The number of ovulations was slightly higher in Romanov ewes (2.90 versus 2.72) and this was also the case for prolificacy of pregnant ewes after 1st mating (2.67 versus 2.24), leading to higher embryonic losses in Finn-ewes.

- Romanov and Fl (Lacaune x Romanov) ewe-lambs. For the whole data, and at the same ovulation rate, the losses were lower in Romanov = litter size of 2.37 with 2.52 C.L. for Romanov, versus 1.90 with 2.10 C.L. for Fl.

III Discussion

1- Heritability of the ovulation rate in 8-10 months old Romanov ewe-lambs was lower than that estimated by HANRAHAN (1980) in 18-30 months old Finnish and Galway ewes (0.45 and 0.57), but higher than that of PIPER et al (1980) in 15-16 months old Merinos ewes.

2- The overall embryonic mortality of Romanov ewe-lambs and ewes was 9-10 points lower than that observed in Finnish and Fl ewes, and also lower than that of Berrichon du Cher ewes (RICORDEAU et al, 1976). It was also (Fig1) 7-10 points lower than the estimations of HANRAHAN (1979) on Finnish ewes and of KELLY and KNIGHT (1979) on Romney ewes. Accordingly, there seems to be breeds differences in ovulation rate as well as embryonic mortality as shown in the rabbit (HULOT and MATHERON, 1981) and the pig (LEGAULT and GRUAND, 1981), especially Chinese sows (ROMBAUTS et al, 1982).

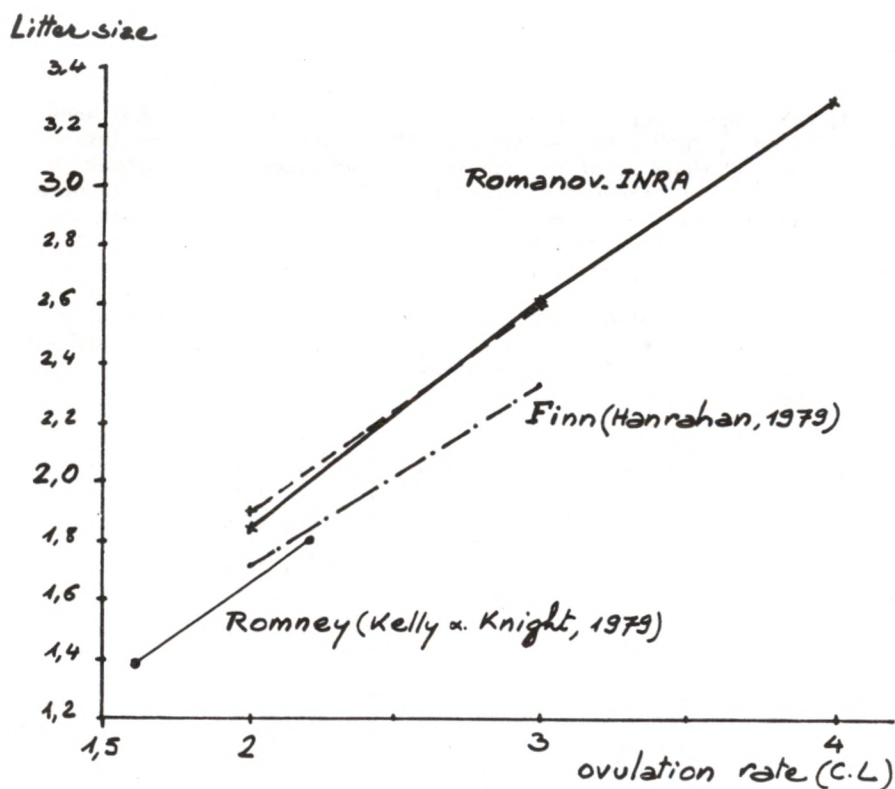


Fig. 1. Relationship between ovulation rate and litter size

SUMMARY

Litter size components were measured on 650 ewe-lambs and 590 adults of the Romanov breed. Ovulation rate increased with age : 2.51 at 8-10 months, 3.26 to 3.57 from 2nd to the 4th year. Heritability of ovulation rate in ewe-lambs, estimated by analysis of variance of data from within-sire half and full sisters, was 0.24 (sire and dam components of variance were quite equal). Embryonic losses (determined in mated ewes or ewes pregaant at first mating) were similar in young and adults. In lambing ewes, we found 1.88, 2.62 and 3.28 lambs respectively for 2, 3 and 4 corpora lutea, i.e losses of 6.0%, 12.5% and 18.0% respectively.

Further observations in 29 Finnish ewes and 49 F1 (Lacaune x Romanov) always showed that losses in contemporary Romanov ewes were smaller.

RESUME

Les composantes de la taille de portée ont été mesurées sur 650 agnelles et 590 adultes de race Romanov. Le taux d'ovulation augmente avec l'âge : 2.51 à 8-10 mois ; 3.26 à 3.57 de la 2ème à la 4ème année. L'héritabilité du taux d'ovulation des agnelles, estimée par analyse de variance des performances des demi-soeurs et pleines-soeurs de père, est de 0.24 (variance père \neq var. mère).

Les pertes embryonnaires (calculées sur brebis saillies ou fécondées à la lère saillie) sont comparables sur agnelles et adultes. Sur les brebis ayant mis bas, on obtient 1.88 - 2.62 et 3.28 agneaux nés avec 2, 3 et 4 corps jaunes, soit respectivement des pertes de 6.0 - 12,5 et 18,0 p 100. Les observations complémentaires effectuées sur 29 brebis Finnoise et 49 agnelles Fl (Lacaune x Romanov) indiquent toujours des pertes plus faibles sur les femelles Romanov contemporaines.

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