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Analysis of lamb mortality in Šumava, Suffolk, Charollais, Romney, Merinolandschaf and Romanov sheep in the Czech Republic

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Introduction:

In the course to increase the number lambs weaned in flock the breeding for litter size and including of young hoggets into reproduction process are applied in sheep populations. On the other hand these intensification factors are often connected with higher lamb mortality, what leads to wasting of biological efficiency of lamb production. It is important then to adapt the production system and/or to find the balance between the reproduction intensity and the lamb mortality. The objective of the study was to estimate effects of type of birth and age of dam on lamb mortality in the most numerous sheep breeds in the Czech Republic.

Material and methods:

Records included 88 423 offsprings from years 1995-2006. Breeds included were Šumava, Suffolk, Charollais, Romney, Merinolandschaf and Romanov. Traits analyzed were percentages of stillborns (including perinatal lamb losses), postnatal lamb mortality to weaning or control weighing (up to 120 days of age) and total lamb losses. The data were analyzed separately for each breed using the least squares analyses. Least squares means for the effects of litter size and dam age were adjusted according to arithmetical means of populations.

Model equation:

$$y_{ijk} = \mu + HY_i + AD_j + LS_k + e_{ijk}$$

where:
- y_{ijk} - % of lamb loses per litter
- μ - population mean
- HY_i - fixed effect of the herd and year
- AD_j - fixed effect of the age of the dam
- LS_k - fixed effect of litter size
- e_{ijk} - random residual error

Table 1: Basic characteristics of the dataset

Breed	Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
Number of litters	22785	18835	15361	9524	15394	6524
Avg. litter size	1.31	1.58	1.54	1.51	1.38	2.47
Avg.% of stillborns	5.37	6.19	6.75	3.75	5.19	6.43
Avg. % of lamb mortality	6.54	7.61	8.29	8.31	9.98	8.08
Avg. % of lamb losses totally	11.92	13.8	15.05	12.06	15.17	14.51

Results:

Table 2: Effects of litter size on percentage of stillborns and perinatal mortality

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	4,8 a	6,5 a	5,2 a	2,6 a	4,5 a	3,5 a
	Std.Err.	0,47	0,42	0,45	0,49	0,55	0,75
2	LSM adj.	6,6 b	5,4 b	7,7 b	4,5 b	6,3 b	4,5 a
	Std.Err.	0,52	0,44	0,46	0,52	0,59	0,53
3	LSM adj.	11,0 c	9,7 c	14,0 c	10,2 c	11,5 c	7,6 b
	Std.Err.	1,71	0,81	0,91	1,05	1,49	0,57
4 and more	LSM adj.	-	18,9 d	27,5 d	10,6 c	14,7 d	11,9 c
	Std.Err.	-	3,26	4,06	4,96	4,58	0,78

Table 3: Effects of litter size on percentage of postnatal mortality

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	5,7 a	6,1 a	5,2 a	2,6 a	4,5 a	3,3 a
	Std.Err.	0,47	0,44	0,45	0,49	0,55	0,75
2	LSM adj.	8,4 b	8,5 b	7,7 b	4,5 b	6,3 b	4,5 a
	Std.Err.	0,52	0,45	0,46	0,52	0,59	0,5 3
3	LSM adj.	15,7 c	12,1 c	14,0 c	10,2 c	11,5 c	7,6 b
	Std.Err.	1,73	0,83	0,91	1,05	1,49	0,57
4 and more	LSM adj.	-	22,3 d	27,5 d	10,6 c	14,7 d	11,9 c
	Std.Err.	-	3,33	4,06	4,96	4,58	0,78

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Table 4: Effects of litter size on percentage of total lamb loses

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	10,4 a	12,6 a	11,6 a	8,0 a	12,5 a	7,0 a
	Std.Err.	0,62	0,58	0,62	0,77	0,85	1,00
2	LSM adj.	15,0 b	14,0 b	17,4 b	15,3 b	19,4 b	11,0 b
	Std.Err.	3,41	0,60	0,65	0,83	0,91	0,71
3	LSM adj.	26,6 c	21,8 c	28,0 c	32,0 c	32,1 c	17,4 c
	Std.Err.	2,24	1,10	1,26	1,66	2,28	0,76
4 and more	LSM adj.	-	41,3 d	40,4 d	28,9 bc	45,1 c	25,5 d
	Std.Err.	-	4,45	5,61	7,92	7,01	1,05

Table 5: Effects of dam age on percentage of stillborns and perinatal mortality

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	10,5 a	9,6 a	11,9 a	11,1 a	17,6 a	10,5 a
	Std.Err.	3,50	1,07	1,30	1,93	1,90	0,72
2	LSM adj.	7,1 b	8,1 b	8,4 b	8,6 b	11,4 b	8,4 b
	Std.Err.	3,41	0,97	1,23	1,84	1,69	0,62
3	LSM adj.	5,8 c	6,,8 c	7,3 c	6,9 c	8,3 c	6,3 b
	Std.Err.	3,39	0 ,94	1,17	1,78	1,64	0,49
4 and more	LSM adj.	8,1 b	8,9 ab	9,7 b	11,5 a	11,5 b	8,6 ab
	Std.Err.	3,41	1,20	1,38	1,92	1,78	1,09

Table 6: Effects of dam age on percentage of postnatal mortality

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	7,6 a	7,9 a	11,4 a	5,3 a	7,0 a	8,3 a
	Std.Err.	3,27	1,04	1,23	1,45	1,62	0,71
2	LSM adj.	6,1 b	7,4 a	6,2 b	4,4 b	6,1 a	5,7 b
	Std.Err.	3,17	0,94	1,16	1,38	1,55	0,61
3	LSM adj.	4,7 c	5,1 b	5,6 b	2,9 c	4,4 b	5,4 b
	Std.Err.	3,16	0,91	1,10	1,34	1,52	0,48
4 and more	LSM adj.	6,3 ab	6,4 a	9,1 c	4,5 a	5,9 a	9,8 c
	Std.Err.	3,18	1,16	1,30	1,44	1,65	1,08

Table 7: Effects of dam age on percentage of total lamb loses.

Litter size		Šumava	Suffolk	Charollais	Romney	Merinoland	Romanov
1	LSM adj.	18,6 a	17,4 a	22,3 a	16,4 a	24,6 a	18,8 a
	Std.Err.	4,59	1,43	1,69	2,31	2,31	0,95
2	LSM adj.	13,3 b	15,4 b	14,6 b	13,0 b	17,5 b	14,0 b
	Std.Err.	4,45	1,28	1,60	2,20	2,05	0,2
3	LSM adj.	10,4 c	11,8 c	13,0 b	9,8 c	12,7 c	11,7 b
	Std.Err.	4,43	1,24	1,52	2,13	1,99	0,65
4 and more	LSM adj.	14,4 b	15,2 ab	18,8 c	15,9 a	17,4 b	18,3 a
	Std.Err.	4,46	1,60	1,80	2,30	2,16	1,44

Note: figures marked by different letters differ significantly(P<0,05)

Conclusions:

Šumava sheep: This breed is well adapted to wet mountains conditions and lamb losses is relatively low. On the other hand the fertility of Šumava sheep is low and the improvement of this trait connected with the maintaining of low lamb mortality level is desirable.

Suffolk: The relatively high percentage of stillborns and perinatal mortality especially in a case of singletons are probably done by high birth weight of lamb. Thus in Suffolk the attention should be paid on selection for lambing easy and on management of pregnant ewes.

Charollais: The lamb losses in Charollais breed are relatively high in the conditions of the Czech Republic. Lambs after birth have worse thermoregulation adaptability and to make the appropriate conditions during lambing is necessary.

Romney: The mortality rate increase in lambs born as triplets or greater. This fact was significant especially in RM, where animals are kept mostly outdoor during the whole year with minimum of individual care. The increasing of triplets frequency is not desirable in this breed and in the future stabilization breeding on litter size should be considered.

Merinolandschaf: In this breed the average lamb mortality was the highest of all breeds included. High mortality was observed especially in litters of young ewes. Including the young hoggets into reproduction process should be connected with good level of their rising and with appropriate care during pregnancy and lambing period.

Romanov: Romanov lambs excelled in survival rate to weaning in all types of birth. Lambs have outstanding vitality and the production systems used in this breed are adapted to high reproduction intensity.

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