Relationship between birth order and birth weight of the pig

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Objectives

This work examines the relationship between birth order (BO) and birth weight (BW) of the pig using a large data set of conventional genotype and of an autochthonous Iberian breed from Portugal (Alentejano).

Materials and Methods

Animals: Data from 292 sows of mixed parity and their piglets from 2 genotypes: 247 Large White x Landrace crossbred (LL) from 4 farms and 45 Alentejano (Portuguese autochthonous breed, Iberian type - AL) from 2 farms. Parity of sows ranged from 1 to 10 in LL sows (mean 3.6±0.1 (s.e.)) and from 1 to 8 in Al sows (4.0±0.3).A total of 3418 LL and 375 AL piglets were born, of which 205LL and 6AL were stillbirths and 43 LL and 7 AL were mummified. The distribution of litter sizes (LS) (total born, TB) in each genotype is show in figure 1. Each piglet was identified, weighed (± 1g) (mummies excepted) and its birth order recorded within 2 min of birth.

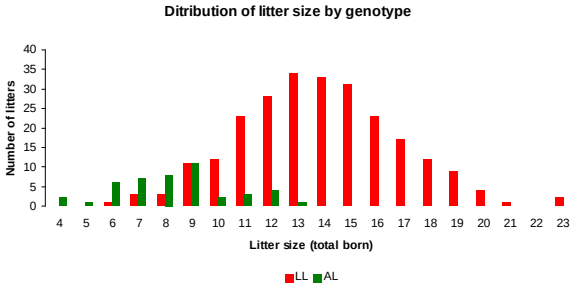

Figure 1 – Distribution of litter sizes by genotype

Statistics: All analyses were made using the software PASW Statistics (version 18.0, 2009). Within litters of the same litter size, the effects of birth order (BO) on birth weight (BW) were determined by both ANOVA. To compare litters of different sizes, BO was expressed as relative BO (RBO) calculated as RBO = (BO-1) / (TB-1). Regressions were made using RBO and BW residues obtained by ANOVA using litter as fixed effect.

Results

Effects of order of the piglet in the birth order on birth weight of piglets (TB) in relation to litter size (LS) and genotype

Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	*P*	*RSE*
LS (n[1])																				
												LL Genotype								
10 (12)	1539	1380	1391	1376	1410	1406	1419	1458	1375	1482									*0.941*	*293*
12 (28)	1420	1442	1519	1491	1513	1417	1445	1423	1485	1460	1428	1525							*0.927*	*317*
14 (33)	1285	1377	1341	1219	1232	1229	1302	1315	1339	1324	1333	1406	1349	1367					*0.437*	*335*
16 (23)	1289	1386	1250	1221	1169	1280	1300	1192	1191	1282	1283	1346	1245	1284	1360	1378			*0.548*	*330*
18 (12)	1307	1298	1156	1320	1240	1168	1236	1138	1173	1113	1210	1176	1221	1279	1240	1149	1350	1358	*0.852*	*316*
												AL Genotype								
9 (11)	1055	1056	989	1035	1107	1057	1057	1108	1139										*0.819*	*200*

[1] n= number of litters

For a given litter size (LL genotype), there was no significant effect of order of birth on birth weight of TB (P ranging from 0.09 to 0.94) or BA piglets (P ranging from 0.19 to 0.93).

OVERALL: Slopes of the within-litter regression lines relating RBO to BW of total born (TB) and born alive (BA) piglets

LL sows: b_{TB} = 71±15 (g) RBO; P<0.0001; R^2=0.006; b_{BA} = 82±15 (g) RBO; P<0.0001; R^2= 0.009

AL sows: b_{TB} = 54±23 (g) RBO; P=0.022; R^2=0.014; b_{BA} = 53±24 (g) RBO; P<0.025; R^2= 0.014

All sows: b_{TB}= 70±14 (g) RBO; P= 0.0001; R^2= 0.007; b_{BA}= 81±14 (g) RBO; P= 0.001; R^2= 0.009

Conclusion

Overall, in both genotypes the slopes of the within-litter regressions between BO and BW of TB or BA piglets were positive. However, although significant, BO explained only a very small percentage (≈1%) of the total variability found in piglet birth weights.

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