Blood markers (Phi and Pgd) and halothane sensitivity in the *French Landrace* pig breed

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A total of 1000 *French Landrace* pigs (758 males and 242 females) from central stations or breeding farms were given a 5-minute halothane test at 25-30 kg liveweight and a blood sample was collected. Each animal was typed with regard to the A and B electrophoretic variants of two red cell enzymes, phosphohexose isomerase and 6-phosphogluconate dehydrogenase, controlled by loci (Phi and Pgd respectively) closely linked to the halothane locus (Hal). Incidence of positive halothane reaction was 8.1 p. 100. Gene frequency estimates were 0.287 for the recessive allele Hal^S, responsible for halothane sensitivity (assuming complete penetrance), 0.745 for the Phi^B allele, and 0.441 for the Pgd^B allele. A preferential association of Hal^S, Phi^B and Pgd^B on the chromosome was demonstrated : the 2-locus linkage disequilibrium coefficients (D) were 0.063 ± 0.005 for Hal and Phi, 0.084 ± 0.010 for Hal and Pgd, and 0.023 ± 0.007 for Phi and Pgd, with D differing from zero at the 0.1 p. 100 level for the three pairs of loci. The probabilities (P) that halothane-negative (HN) pigs were not carriers of Hal^S, depending on their blood types [Phi, Pdg] were derived from estimated 2- and 3-locus haplotype frequencies. The Phi-Pgd blood typing allowed to detect among HN pigs around 7 p. 100 pigs ([Phi^A, any Pgd whatever]) for which P was higher than 0.89, and around 14 p. 100 pigs ([Phi^{AB}, Pgd^A]) for which P ranged around 0.78. Use of blood typing for Phi and Pgd systems as an aid for selection against Hal^S in the *French Landrace* breed is briefly discussed.

Relationships between a genetic marker — the major histocompatibility complex — and sow prolificacy and piglet mortality

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The frequency of the different haplotypes of the pig major histocompatibility complex (SLA) varies according to the populations considered. Because of the frequency of some haplotypes in *Large White* hyperprolific sows, we studied the relationship between SLA and sow prolificacy, on the one hand, and piglet mortality on the other hand. We determined the SLA haplotypes of sows belonging to two consecutive generations of a *Large White*

herd having farrowed twice (272 litters) of 969 crossbred *Pietrain* × *Large White* piglets born in the 2nd litters of the 1st generation (group 1) and 579 *Large White* piglets born in the 1st litters of the 2nd generation (group 2). We did not observed any significant effect of sow haplotypes on the number of live born, still born or weaned piglets. We found a significant reduction in the size of the litters in which 25 p. 100 of the piglets should be homozygous for SLA, because their parents had the same haplotype (— 2 piglets born per litter, $P < 0.01$). In group 1, as far as haplotype 2 was concerned, this reduction was due to a significant deficit in homozygous piglets (8.9 instead of 25 p. 100, $P < 0.01$). Thus, there may be a lethal gene associated to this haplotype. In the two groups, the presence of haplotype 1 was associated with a lower mortality rate before weaning. In group 1, it seems that the presence of haplotype 1 was associated with a higher mortality after weaning due to diarrhoea, but this was not the case in group 2. It may be concluded that the main effect of SLA is the unfavourable influence of homozygoty on prolificacy.

Effect of age and backfat thickness on reproductive performance of 100 kg *Large White* sows

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The age and backfat thickness of 5000 *Large White* selection gilts of 100 kg live weight tested in 1981 and 1982 were related to their reproductive performance as multipliers until the 4th litter. Performances at 100 kg were found to have a marked effect on longevity. Cullings before the 3rd litter were all the more frequent as performances at 100 kg were high. Thus, 45 p. 100 of the animals exhibiting the lowest performances (age at 100 kg $\geqslant$ 170 days or backfat thickness at 100 kg $\geqslant$ 20 mm or standard index $<$ 80 points) reached the fourth litter versus 28 p. 100 of the animals with the highest performances (age at 100 kg $<$ 140 days, backfat at 100 kg $<$ 14 mm or standard index $\geqslant$ 120 points). Prolificacy was not affected. However, the 1st and 2nd litter of the leanest sows at 100 kg tended to be 0.3 to 0.5 piglet larger than those of the fattest sows of the same weight.

This study showed that longevity has to be taken into account in any experiment on sow herd management. Moreover, it is necessary to study the possibilities of improving longevity of purebred herds using other techniques than genetic ones before reconsidering selection goals in female lines.