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# ADDITIVE GENETIC, HETEROSIS AND MATERNAL EFFECTS ON PRODUCTION TRAITS IN A CROSSING EXPERIMENT BETWEEN DUTCH FRIESIAN AND HOLSTEIN FRIESIAN CATTLE

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This report describes an experiment with sheep designed to estimate individual heterosis, maternal heterosis and recombination loss. The estimation procedure is outlined and estimates obtained for growth traits, carcass traits and found conversion are presented and discussed. The experiment involved the production of 3 pure breeds of sheep, *Columbia*, *Suffolk* and *Targhee* and all 2 - breed and 3 - breed crosses between them (including reciprocals). Heterosis and recombination effects were estimated by linear contrasts of appropriate least - square effects. Individual heterosis estimates for growth and carcass traits were not significant ( $P < .05$ ) but were generally favourable. Highly significant ( $P > .01$ ) individual heterosis effects (3.2 per cent) were observed for feed conversion. No significant ( $P < .05$ ) maternal heterosis or recombination effects were observed for any of the traits studied. Maternal heterosis effects were generally favourable while effects of recombination were unfavourable.

## MATERNAL EFFECTS ON REPRODUCTIVE TRAITS IN PIGS

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Litter data from some unselected 2 000 auctioned gilts (littersize  $8.3 \pm 2.9$ ) were used to estimate regressions of gilt's littersize on littersize of dam, when the gilt was born ( $b_1 = .06 + .03$ ), on another independent litter ( $b_2 = .14 \pm .04$ ), and on littersize of the granddam ( $b_3 = .05 \pm .04$ ). Assuming a model where littersize is influenced both by the genotype of the gilt ( $h^2$ ) and the size of her birth litter ( $m$ ), yielded the estimates  $h^2 = .26$ ,  $m = -.07$  and, as correlation between adjacent litters of one gilt due to non-genetic effects,  $c = -.14$ . Under this model it may be assumed that the depressive effect of the size of the birth litter on the litter size of offspring, should be expressed most clearly in gilt litters and least in litters of adult sows. The regression equations of gilt littersize on size of birth litter ( $x$ ) of the gilt was  $-1.04x + .05x^2$  when the latter was the first litter but  $+ .07x - .01x^2$  when the birth litter was the 4<sup>th</sup>. It appears that the heritability of littersize is larger than computed generally from dam-daughter regressions without consideration of the direct littersize effect.

ADDITIVE GENETIC, HETEROISIS AND MATERNAL EFFECTS  
ON PRODUCTION TRAITS IN A CROSSING EXPERIMENT  
BETWEEN DUTCH FRIESIAN AND HOLSTEIN FRIESIAN CATTLE

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In the second generation of a crossbreeding experiment with *Holstein Friesian* bulls and *Dutch Friesian* cows the difference in additive genetic merits between *Holstein Friesian* and *Dutch Friesian* bulls ( $a$ ), the heterosis effects ( $d$ ) and the maternal effects ( $m$ ) were calculated from the mean values of the four subpopulations with 0 per cent, 25 per cent, 50 per cent and 75 per cent *Holstein Friesian* genes. Significant  $a$  effects were found for milk yield, fat percentage, fat yield, protein yield, fleshiness (beef bulls and veal calves), fat covering (beef bulls), dressing percentage (veal calves), birth weight, percentage of calving difficulties and gestation period. A significant  $d$  effect was found for fat covering (beef bulls). For dressing percentage (veal calves), for the percentage difficulties and for the percentage of retentio secundinarum significant  $m$  effects were calculated.