considered as control (c). The low heritability estimate for the dam-daughter pathway ($h^2 = .02 \pm .03$) suggests that unfavourable maternal effects exist. In contrast, the realized heritability estimated for the paternal pathway is higher ($h_r = .14 \pm .05$). The latter parameter allows to assess the overall efficiency of the breeding scheme for D = 12 on average, an advantage of 0.84 piglets born and .60 piglets born alive per litter was established by the daughters of H boars. The overall economic gain resulting from this genetic progress in prolificacy is expected to be about 5 % in a herd using boars from the H line. However, a lower heritability was found for 1st parity litter size whereas genetic correlations between successive litter sizes were markedly less than unity. The possible causes for these differences and the consequences on the breeding policy are discussed.

II. — REPRODUCTION

Recent advances in boar semen storage technology

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This review makes a general survey of techniques used for the preservation of semen in the liquid or frozen state.

As regards storage in the liquid state several extenders have been developed to preserve the fertilizing capacity of semen for several days. In order to obtain the highest conception rate and prolificacy, it seems necessary in the present state of our knowledge to use the total fraction of ejaculate and to extend semen in B.T.S. to obtain 3×10^9 spz/100 ml. In such conditions, the fertilizing capacity is preserved up to 3 days after collection without reduction in conception rate and prolificacy.

As regards storage of deep-frozen semen, several methods have been developed. Semen quality after thawing varies according to the freezing-thawing extenders used and to the techniques of preparation and storage. Analysis by electronic microscopy, after cryosubstitution, of spermatozoa and their environment shows that their dehydratation at freezing is an important factor for the preservation of semen quality after thawing, at least as regards the acrosome integrity. Results of artificial inseminations performed during the last 10 years do not show a difference between straws and pellets concerning the farrowing rate and prolificacy. However, other factors such as insemination period, inseminator and boar may affect fertility. In conclusion, frozen semen used for A.I. can be expected to result in a conception rate 20 to 30 % lower and in a litter size about 1 to 3 piglets smaller than does fresh semen.

Comparison of different techniques of storage of boar semen. Effect on fertilization mechanisms

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An experiment was made to compare the effect of using semen stored in the liquid or frozen state on fertilization mechanisms. Twenty four sows distributed into 4 groups were inseminated

with fresh or deep-frozen semen 24 or 36 hours after injection of 500 U.I . hCG at proestrus. After slaughtering, oocytes were collected, treated according to the classical histological techniques (10 μ-sections) and observed by photon microscopy.

Results showed that the percentage of oocytes fertilized per sow and the number of spermatozoa per egg were significantly lower in sows inseminated with frozen semen than in those inseminated with fresh semen (37.2 *vs* 81 % fertilized oocytes and 0.9 *vs* 36.9 spermatozoa/egg, respectively).

In contrast, histological analysis of the eggs did not show any difference between frozen and fresh semen relative to fertilization quality. Each oocyte penetrated by a frozen spermatozoon emitted the second polar globule and developed. No specific abnormality related to insemination with frozen semen was observed in the activation process.

Results showed a predominance of the pronucleus stage in all groups and the presence of segmented eggs only after insemination with fresh semen.

Whatever the previously studied parameters there was no difference between animals inseminated at different times after hCG.

Effect of freezing on the nucleus of boar spermatozoa

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A study was made with the aim of testing the effect of deep-freezing on the nucleus quality of boar spermatozoa. Two techniques of analysis were used : staining sperm with acridine orange to study DNA denaturation and cytophotometric measurement of chromatin after staining DNA by Feulgen method.

Results showed that after staining with acridine orange, the percentage of spermatozoa whose nucleus possessed denatured DNA did not change before and after freezing (7.1 *vs* 10.7 %, respectively). In contrast, freezing caused a significant reduction in DNA-Feulgen content of the nucleus (4.83 *vs* 4.27, respectively before and after freezing) and in its surface (31.3 μm^2 *vs* 30.5 μm^2, before and after freezing, respectively). Quantitative analysis of DNA-Feulgen showed an effect of freezing on the structure of chromatin.

Bacteriological characteristics of boar semen used in artificial insemination

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Two trials were conducted in order to assess the bacterial contamination of extended semen under practical farm conditions. A preliminary trial involving 20 semen samples prepared for artificial insemination showed that semen microflora remained quite steady during the first 24 hours of storage at 18-20 °C. However, after 48 hours of storage at 20 °C a significant increase in contamination was observed. A second trial involving 60 ejaculates from 22 boars (4 herds) confirmed the previous findings : extented semen routinely prepared on-farm (without addition of antibiotics) may be severely contaminated and figures as high as 10^5 bacteria per ml of extended semen were found in 8 % of the samples. After 48 hours of storage the number of contaminated