SUMMARY
of the PHD THESIS

Researches regarding the season influences on the reproductive performance in sows raised in industrial system

Research has been conducted on biological material represented by a nucleus of Landrace x Yorkshire primiparous and multiparous sows, from Denmark, grown in a commercial piggery in Romania (during adaptation).

1.The first chapter of results and discussion concerns the effects of season and parity on the sow prolificacy. This chapter has investigated the effect on these factors on litter size, total born piglets and born alive piglets, weight at birth and weight gain during suckling period.

In primiparous, litter size ranged from a minimum of 12.08 cap. in August and a maximum of 14.62 cap. in January. Also in primiparous number of born alive piglets ranged between a maximum in February (14.00) and a minimum in August (9.50). The ratio of the total number of piglets and born alive piglets close to a value of 1 (1.05 to 1.02) in primiparous sows farrowing during fall and to a furthest value of 1 (1.29 to 1.27), tor those primiparous sows which farrowed in summer.

Season effects on the litter size in multiparous sows, although existing, occurred less prominent, the maximum litter size being centered in winter months, with an average of 15.55, and the minimum litter size in the summer months, as in the case of primiparous, with an average of 13.99 piglets per capita. Number of born alive piglets, also presented season differences with a peak during the winter months (15.21 cap.) but minimum values during the summer months (12.36 piglets).

Season evolution of the percentage of born alive piglets in the two categories of sows may be correlated with the location of the calendar period of oestrus and mating, respectively photoperiodicity. The sows of maximum parameters of prolificacy were mated in September and October, when natural photophase is declining.

Analysis of weight at birth revealed seasonal influences on both primiparous and multiparous sows, with a higher average weight at birth in the spring season, but no significant differences between the two groups of sows. Analysis of the distribution of body weight groups led to the finding that in autumn and winter, the highest percentage of newborn piglets (30-32%) were categorized between 1.100 and 1.200 g. In spring and summer, the highest percentage of newborns (29-30%) was categorized between 1,300 and 1,400 g.

2. Study of seasonal influences on oestrus particularities focused on: the age of the first occurrence of oestrus, weaning-to-oestrus interval and oestrus length. Regarding the seasonal influences on the first oestrus age (considered as puberty age), the early estrous cycles were recorded in autumn season in which a percentage of 23.2% of monitored sows showed oestrus before the age of 180 days, compared to 21.7, 16.0 and, respectively, 13.5 in other chronological seasons. The same autumn season is characterized by the highest percentage of gilts which came into heat in the mean age of 181-200 days: 56.5% vs. a minimum percentage in June-September, which could be attributed to the high temperatures of this season.

Regarding the season influences on weaning-to-oestrus interval, both in primiparous and multiparous sows there is a speed up influence in summer and autumn, vs. winter and spring, these effects being stronger in primiparous: 6.64 days annual mean vs. 5.02 days multiparous. The mean length of weaning-to-oestrus period were maximum in youngest primiparous group (7.96 days for 300 day-old sows), decreasing progressively with increasing age (6.55 days in over 360 day-old sows).

As regards the duration of oestrus in primiparous sows, lower values are found in summer seasons (1.58 days) and autumn (1.46 days) compared to winter (2.38 days) or the spring (2.42 days). In multiparous sows there is a similar situation, values being higher: 2.98 in summer, 2.72 days in autumn, 3.3 days in winter and 3.26 days in the spring. It appears that these differences are blurred in the winter and spring seasons and more obvious in summer and autumn seasons. Note that significant differences were found between groups and multiparous and primiparous sows in the frame of the same season for summer and fall seasons, not for the winter and spring. It also noted a correlation between weaning-to-oestrus interval and oestrus duration: the former resulting in decreasing of the second.

3. As regards seasonal effects on gestation length it was found that pregnancy length amounts to an annual average of 114.0 days and 115.17 days in primiparous and, respectively, multiparous, which is a difference of 1.17 days. Both in primiparous and multiparous, pregnancy length showed a downward trend from the autumn to summer: 114.20 → 113.6 days in primiparous and 116.6 → 115.7 days in multiparous. At least in multiparous, pregnancy is correlated to some extent inversely proportional to the litter size.

Season effects on infertility (expressed as the percentage of non-pregnant sows at 25 days since natural or artificial insemination) show minimum values in autumn (7.69% in primiparous and, respectively, 7.35%) and a peak in the spring season (17.24% and, respectively, 14.73%).

4. With respect to the season influence on reproductive endocrinology, levels of the following hormones were determined: 17-beta-estradiol, progesterone, luteinizing hormone, follicle stimulating hormone and melatonin.

Blood plasma 17-beta-estradiol values appear to be not differentiated by type of parity, and not by different seasons at the moment of weaning, values fluctuating around 22 pg • mL-1. In the case of sows during heats, both season and parity differences have been identified. Thus, the maximum values were recorded in September, both in primiparous and multiparous, with significantly lower levels in primiparous sows (58.9 pg • mL-1) compared to multiparous (66.6 pg • mL-1).

Regarding the changes in plasma progesterone levels, higher values were found in December: 36.9 ng•mL-1 in primiparous, and 46.5 ng•mL-1 in multiparous, but the minimum values in the autumn.

Luteinizing hormone level was determined on two groups of sows, primiparous and multiparous in two different physiological states: oestrus and pregnancy. Four series of measurements were performed, one for each season: September, December, March and June. LH levels ranged between 9.6 and 14.5 ng • mL-1 in primiparous sows and between 12.0 and 16.5 ng • mL-1 in multiparous sows during oestrus. Statistical analysis revealed significant differences between seasons (with a peak in autumn - winter) for both, primiparous and multiparous. The combined analysis of the levels of progesterone and LH show that there is a correlation between the levels of these hormones, low secretion of LH period corresponding to a reduced secretion of progesterone.

Regarding the plasma levels of follicle stimulating hormone of primiparous sows in oestrus, a season influence couldn't be concluded. In multiparous sows, there is a relatively similar situation, with higher values in the spring season. Average plasma levels of this hormone amounts to 139.5 ng • mL-1 in primiparous sows and 165.1 ng • mL-1 in multiparous sows.

Melatonin secretion shows different values for pregnant and non-pregnant sows, both in terms of photoperiodicity (seasonal) and diurnal. For both physiological conditions, the maximum values were found at middnight and minimal values at middday. During maxim scotophase, the values were 22.2 pg • mL-1 in lactating sows and 26.9 pg • mL-1 in pregnant sows, thus revealing sensitivity differences related to physiological state. During maxim photophase, the

recorded values were 1.55 pg • mL-1, respectively, 1.01 pg • mL-1. Luteinizing hormone secretion doesn't appear to be related to the melatonin.