*The Voluntary Food Intake of Pigs*
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# THE USE OF MILK REPLACERS AND THE EFFECT ON SUBSEQUENT PERFORMANCE OF NEWBORN PIGLETS

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## INTRODUCTION

Robison (1972), Revelle and Robison (1973), Alsing (1976) and Johansson (1980) reported that female animals, originating from large litters, have less reproductive capacity than females coming from small litters. Research in Melle showed that reduction of the litter size as well as early weaning has a positive influence on the reproductive performance of female piglets (van der Heyde, 1983; van der Heyde and Lievens, 1982, 1984a and b). Van der Steen (1985) found that gilts raised in litters, standardized to 12 piglets, produced smaller litters (by 0·48 piglets) compared with those raised in litters, standardized to six piglets. The results obtained suggested that a low standardization level positively affects weaning weight and the development of the uterus of the gilts. Csarnecki, Wejehsza and Owsianny (1986) proved that this positive effect on reproductive performance was not only true for female, but also for male piglets. These facts suggest that post-natal feeding could be very important regarding the subsequent reproductive performance.

A trial was carried out to investigate the effect on growth rate and subsequent reproductive performance of giving to newborn piglets milk replacer *ad libitum*. At the time of instituting this approach, it was recognized that supplementary feeding during the pre-weaning period might cause a transient hypersensitivity to food antigens in the immediate post-weaning period, leading to changes in the small intestine structure and to diarrhoea (Miller, Newby, Stokes and Bourne, 1984; den Hartog, Verstegen and Everts, 1985; Hampson 1986). At the same time, the use of milk replacers had been shown to reduce mortality and improve growth rates, without any deleterious effects at weaning, in other work (Op de Beck and Castaldo, 1983). Besides this last report, only two other publications (van der Steen, den Hartog, de Grost and de Roo, 1983; van Rijen, 1985) have been found for the period 1980-1988, concerning the influence of intake of milk replacer on growth rate of piglets.

The intake of milk replacer had no significant influence on mortality up to 8 weeks post weaning: 91% of the piglets reared without milk replacer and 90% of the piglets reared with milk replacer, survived.

## MATERIAL AND METHODS

Litter size was standardized at nine to 11 piglets and weaning age at 12 days. The performance of 390 Landrace piglets, receiving *ad libitum* milk replacer during the suckling period, was compared with that of 88 control piglets. A commercial milk replacer (crude protein 210 g, fat 80 g, carbohydrate 500 g/kg was provided daily in small cups or in nipple drinkers. After weaning, piglets were reared in cages for 4 weeks at 27°C and subsequently 4 weeks at 25°C. After weaning, piglets received 3 kg milk replacer powder and a starter diet containing 610 g barley, 260 g soya, 90 g skimmed milk powder and 40 g vitamins and minerals per kg.

In order to determine the variation in intake of milk replacers, according to their composition, eight commercial milk replacers were compared one by one on the basis of the solubility, the preservation and the level and speed of intake. Crude protein content of these milk replacers ranged from 190 to 250 g/kg, fat content from 70 to 150 g/kg and carbohydrate content from 30 to 50 g/kg.

## RESULTS

The average weight at weaning and at 4 weeks after weaning, of all piglets reared with milk replacer, was higher than that of the control piglets (Table 1). The average daily growth rate showed the same tendency. However, none of these differences was significant. When growth rate of male and female piglets was analysed separately, there was one significant difference ($P < 0{\cdot}05$): male piglets in the group reared with milk replacer grew 397 g/kg *v.* 441 g/day for the male control piglets, from the age of 4 to 8 weeks post weaning. As male and female piglets were compared within the treatment group and the control group, it became obvious that female piglets especially benefit from the intake of milk replacer (Table 1). Birth weight of female piglets was 0·93 to 0·94 of birth weight of male piglets. Without milk replacer supplementation this difference

remained up to 4 weeks post weaning. Using milk replacer, this difference disappeared at weaning age; at the age of 8 weeks post weaning, the average weight of the female piglets was 1·08 of the average weight of the male piglets ($P < 0·01$). Growth rate showed the same tendency: the female piglets of the control group could hardly catch up their male littermates. As for the group reared with milk replacer, the female piglets grew 12 g/day better from weaning to 4 weeks after weaning ($P < 0·05$) and 48 g/day better from 4 to 8 weeks after weaning ($P < 0·01$), compared with their male littermates.

TABLE 1

*The effect of intake of milk replacer during the suckling period, on live weight and growth rate of male and female piglets*

| | With milk replacer | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Female (no. = 184) | | | Male (no. = 206) | | | Total (no. = 309) | |
| Weight (kg) | Mean | s.d. | % | Mean | s.d. | % | Mean | s.d. |
| Birth | 1·48** | 0·30 | 94·3 | 1·57** | 0·31 | 100 | 1·53 | 0·31 |
| Weaning | 3·73 | 0·93 | 100·5 | 3·71 | 1·02 | 100 | 3·72 | 0·98 |
| 4 weeks | 8·64 | 2·19 | 104·2 | 8·29 | 2·24 | 100 | 8·45 | 2·22 |
| 8 weeks | 21·09** | 4·82 | 108·6 | 19·42** | 4·96 | 100 | 20·21 | 4·97 |
| Growth rate (g/day) | | | | | | | | |
| Birth to weaning | 188 | 56 | 103·9 | 181 | 64 | 100 | 184 | 61 |
| Weaning at 4 weeks | 175* | 57 | 107·4 | 163* | 58 | 100 | 169 | 58 |
| 4 to 8 weeks | 445** | 114 | 112·1 | 397** | 123 | 100 | 420 | 121 |
| | Without milk replacer | | | | | | | |
| | Female (no. = 46) | | | Male (no. = 42) | | | Total (no. = 88) | |
| Weight (kg) | Mean | s.d. | % | Mean | s.d. | % | Mean | s.d. |
| Birth | 1·49 | 0·36 | 92·5 | 1·61 | 0·33 | 100 | 1·55 | 0·35 |
| Weaning | 3·51 | 0·95 | 94·1 | 3·73 | 1·07 | 100 | 3·61 | 1·01 |
| 4 weeks | 8·10 | 1·96 | 94·8 | 8·54 | 2·27 | 100 | 8·31 | 2·11 |
| 8 weeks | 20·76 | 3·86 | 99·3 | 20·90 | 3·95 | 100 | 20·83 | 3·88 |
| Growth rate (g/day) | | | | | | | | |
| Birth to weaning | 179 | 86 | 99·4 | 180 | 69 | 100 | 180 | 78 |
| Weaning at 4 weeks | 164 | 47 | 95·4 | 172 | 53 | 100 | 168 | 50 |
| 4 to 8 weeks | 452 | 95 | 102·5 | 441 | 99 | 100 | 447 | 97 |

TABLE 2

*The effect of intake of milk replacer during the suckling period, on subsequent reproductive performance (litter size)*

| | Milk replacer | | | | | |
|---|---|---|---|---|---|---|
| | Without | | | With | | |
| Litter size | No. of litters | Mean | s.d. | No. of litters | Mean | s.d. |
| Litter 1 | 21 | 9·1 | 2·1 | 16 | 10·1 | 1·9 |
| Litters 2 to 5 | 39 | 9·0 | 2·5 | 16 | 10·4 | 2·6 |
| All litters | 60 | 9·1* | 2·3 | 32 | 10·3* | 2·3 |



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Although Op de Beck and Castaldo (1983), van der Steen *et al.* (1983) and van Rijen (1985) reported that the use of milk replacer during the suckling period could improve growth rate of piglets, none of these reports mentioned any difference in performance of male or female piglets, due to the intake of milk replacer during the first days of life.

From 51 female piglets of the group reared with milk replacer and 49 control piglets, the subsequent reproductive performance was analysed. There was no significant difference between the treatments either in the number of sows removed for reproductive reasons or in the reproductive results, except when all parities were taken into consideration: average litter size was 1·2 ($P < 0·05$) piglets higher for the sows reared with milk replacer (Table 2). However, these results should be treated with caution. However, in that so far, only 16 and 21 females reared with and without milk replacer, respectively, have produced a first litter.

Two of the eight commercial milk replacers tested showed insufficient solubility and preservation characteristics. Comparison of the average level of daily intake of the other milk replacers (no. = 51 litters) showed that the intake itself can vary considerably, according to the kind of milk replacer: on the 1st day the average intake ranged from 15 to 40 ml/day, and on the 7th day from 40 to 70 ml/day. The total intake during the first 7 days of life, varied from 250 to 400 ml. Over 90% of all litters receiving milk replacer started drinking the 1st day after birth.

## CONCLUSION

According to this experiment, the intake of milk replacer during the first 12 days of life has no effect on mortality. However, the use of milk replacer has a positive influence on growth rate of female piglets, and could in this way, influence their eventual reproductive performance. The intake of milk replacer itself varies considerably according to type.

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