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Intermittent suckling affects feeder visiting behaviour in litters with low feed intake

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ABSTRACT

Intermittent suckling (IS) has proven to stimulate creep feed intake in suckling piglets. This paper describes the development of feeding behaviour in three litters with high (H) and three litters with low (L) feed intake during lactation in both control (C) and IS treatment. In order to synchronize the start of intermittent suckling within a farrowing room, treatment day 0 (T0) was designated as the start of data collection. IS litters were separated from the sow for a period of 12 h/day (0930 to 2130) from T14 to weaning (T25). Feeder visits of individual piglets and nursing behaviour were analysed from continuous video recordings at 5 treatment days: T13, T16, T24, T25 and T26.

A high number of CL piglets never visited the feeder during lactation; at T24, 56% of the CL piglets did not visit the feeder. On the other hand, 91% of the ISL and CH piglets and all ISH piglets visited the feeder at least once at T24. In contrast to the other groups, no increase was seen in visiting frequency during lactation in CL piglets. At T24, visiting frequency was higher in ISL than in CL piglets. So, IS stimulated piglets from low feed intake litters to visit the feeder. Between T16 and T24, total feeder time increased in piglets from all groups ($P<0.05$), except in CL piglets in which no change was found ($P>0.10$). Latency to first visit to the feeder after weaning did not differ between groups.

It is concluded that IS stimulates piglets from litters with a low level of creep feed intake to visit the feeder during lactation, which familiarizes them with the feeder and the feed during lactation. The IS treatment does not affect feeder visiting behaviour of piglets with an anyhow high level of feed intake during lactation.

1. Introduction

In pigs, creep feed intake during lactation is positively correlated with feed intake after weaning (Bruininx et al., 2002) and with average daily gain after weaning (Appleby et al., 1991; Bruininx et al., 2002; Pajor et al., 1991). Also net absorption in the small intestine (i.e. the net result of secretion and absorption) immediately after weaning is significantly higher in piglets consuming creep feed during lactation than in non-eating piglets (Kuller et al., 2004b), thereby probably decreasing the risk of post-weaning diarrhoea. Hence, stimulating creep feed intake in suckling piglets could be important to optimize pig performance after weaning.

Creep feed intake in suckling piglets is usually low during lactation but can be stimulated by intermittent suckling (IS; Berkeveld et al., 2007; Kuller et al., 2004a; Kuller et al., 2007), a management procedure in which piglets are separated from the sow for a number of hours every day during the second half of lactation. IS increases average creep feed intake per piglet and also increases the number of litters with a high feed intake during lactation (Kuller et al., 2004a). However, also during IS treatments, litters have been identified with little or no creep feed intake during lactation. Apparently, some litters

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start eating creep feed during lactation, whereas others hardly increase their feed intake when subjected to IS. In a previous experiment (Kuller et al., 2004a), we found that IS litters consuming little or no creep feed during lactation still tended to have higher feed intake and weight gain shortly after weaning than control litters with a comparable low feed intake during lactation. So, positive effects of IS on post-weaning performance may also be mediated by other factors than by increased creep feed intake during lactation alone.

Little is known regarding the development of creep feed intake during lactation by individual piglets, because creep feed intake is usually determined at the litter level. One way to investigate the development of creep feed intake by individual piglets during lactation and shortly after weaning is to investigate feeder visiting behaviour by quantifying the number and duration of visits to the feeder over time. It is of interest to study the development of feeder visiting behaviour in intermittently suckled piglets, not only because IS stimulates creep feed intake during lactation but especially because it also stimulates feed intake shortly after weaning in litters with a low level of creep feed intake during lactation.

We hypothesise that IS will stimulate especially piglets from low feed intake litters to visit the feeder during lactation, thereby familiarizing piglets with the feed and the feeder during lactation. In order to find out whether milk intake could have influenced creep feed intake, nursing characteristics were also studied.

2. Materials and methods

2.1. Treatments, animals and housing

The experimental design was approved by the Ethical Committee of the Veterinary Faculty of Utrecht University (The Netherlands). The sows used in the current experiment were also part of another study investigating the effects of intermittent suckling on weight gain and feed intake until slaughter (Kuller et al., 2007). Sows were allotted to either a control (C) or intermittent suckling (IS) treatment. Control piglets had access to the sow for 24 h/day until weaning. IS piglets were separated from the sow for 12 h each day (0930 until 2130) and allowed access to the sow for the other 12 h (2130 until 0930). Only one treatment was applied per farrowing room to avoid an influence by suckling of control piglets on IS piglets, since suckling is highly synchronized between animals in a room.

In order to synchronize the start of intermittent suckling within a farrowing room, treatment day 0 (T0) was designated as the start of data collection. Piglets were born from 1 day before to 2 day after T0. Intermittent suckling always started at T14 and piglets were weaned at T25 at 0800 a.m. During the separation period, piglets and sow remained in the pen and were separated by a removable wooden partition (height 65 cm) that was attached on both sides to the farrowing crate of the sow, not allowing any physical contact between sow and piglets. The sows were housed in farrowing crates in a farrowing pen (2.40 × 1.80 m). The farrowing pen consisted of a partly solid floor and a partly slatted floor. During the separation period, IS piglets were allowed extra space (solid floor) at the back of the pen to create comparable floor space with that of the control piglets. Lights were on between 0730 and 2330. To facilitate video recordings, a low level of light (12 lux) was maintained during the night. At weaning sows were moved to a mating room and the piglets remained in the pen.

Video recordings were made of 28 sows (14 IS and 14 control). From each treatment, six sows were selected, based on feed intake level of the litter during the complete lactation period; high (H): feed intake >90 g/piglet or low (L): feed intake <85 g/piglet). So, there were 3 CH litters ($n = 32$ piglets; control, high feed intake level) and 3 CL litters ($n = 27$ piglets; control, low feed intake level), 3 ISH litters ($n = 28$ piglets; intermittent suckling, high feed intake level) and 3 ISL litters ($n = 32$ piglets; intermittent suckling, low feed intake level). Before start of IS treatment no differences were found in feed intake of the litters (CH: 24 ± 11 vs. CL: 18 ± 2 vs. ISH 23 ± 3 vs. ISL: 15 ± 5 g/piglet; $P > 0.10$) and weights (CH: 4587 ± 523 vs. CL: 5075 ± 302 vs. ISH 5500 ± 354 vs. ISL:4550 ± 325 g/piglet; $P > 0.10$) between the groups. Data of individual litters are shown in Table 1.

2.2. Piglet feeding

Water was available ad libitum by means of a drinking nipple at the rear end of the pen. Creep feed residuals were weighed per litter at 7 day intervals. Because no food wastage was observed (feeder was placed on a solid floor), disappeared feed was considered eaten. Creep feed based on milk products (34%), soybeans, corn, sugar, vegetable oil and a premix (12.8 MJ NE kg^{-1}, 21.7% CP, 14.7% crude fat, 2.0% crude fiber, 5.2% ash, 1.46% lysine, 0.86% calcium, 0.58% phosphorus, 160 mg kg^{-1} copper, 500 units kg^{-1} phytase; as-fed basis) was offered to the piglets ad libitum from T7 onwards and given in a round piglet trough (diameter 25 cm). From T14 onwards a pig feeder with 4 feeding spaces was used (11 cm feeder space/piglet). From T21 to T23 a gradual change (respectively 40%, 60% and 100% replacement) was made to a weaner diet, based on milk products (18.5%), barley, soy beans, corn, sugar, vegetable oil and a premix (11.4 MJ NE kg^{-1}, 17.9% CP, 10.7% crude fat, 2.9% crude fiber, 5.8% ash, 1.25% lysine, 0.77% calcium, 0.59% phosphorus, 160 mg kg^{-1} copper, 500 units kg^{-1} phytase; as-fed basis). This was given until T31 (7 days after weaning) of the experiment.

2.3. Measurements

Video recordings were made continuously for 24 h at five treatment days; T13 (day before start of IS), T16 (3 days after onset IS), T24 (day before weaning), T25 (day of weaning) and T26 (day after weaning). All piglets had been marked on their back to allow individual identification. When a piglet stayed for at least 2 s with its head in the feeder, this was recorded as a visit and beginning and end of the visit were recorded. The following parameters of feeder visiting behaviour were calculated for each piglet: total time spent at the feeder per piglet per day (total feeder time, s), visiting frequency per day and average time per visit per day (average feeder time, s).

Nursing was defined as more than 50% of the litter being active (massaging or sucking) at the udder. The nursing was considered to be ended by the sow, when she turned to sternal recumbence or, in case of a nursing while standing,