# An Evaluation of Suckling and Post Weaning Practices in Relation to the Stimulation and Ease of Detection of Oestrus in Nepalese Pakhribas Pigs

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**ABSTRACT** : Thirty second parity sows of the synthetic Nepalese Pakhribas genotype were used to investigate factors which might improve the occurrence and expression of estrus. The experiment had two sequential elements. In part 1, a change in suckling pattern was applied during lactation, and in part 2, different estrus detection methods were evaluated after weaning. All sows received the same pattern of weaning, which imitated the progressive weaning system used in Nepalese villages. Piglets from each litter were weaned at three ages (6, 7 and 8 weeks of age) in the proportion of 0.5 at 6 weeks followed by 0.25 at each of the subsequent weanings. In the first lactation treatment, the suckling pattern was left undisturbed, similar to the practice used in the villages in which the remaining piglets after first weaning are allowed continuous suckling. In the other treatment, the remaining piglets after first weaning were allowed to suckle their sows only during the night, whilst in the day time (09:00-16:00) they were excluded from the sow but left free to roam around. After weaning, estrus detection procedures were carried out in the absence or presence of two different boar stimuli: a synthetic boar pheromone spray or fresh boar urine. These were applied sequentially in a sequence of testing that alternated for each sow on a daily basis. The weaning to re-mating interval was significantly longer for the unrestricted suckling treatment. All sows were re-mated within 30 days after first weaning in the restricted suckling treatment groups, whereas only 71% of sows were re-mated within 30 days after weaning in the unrestricted suckling treatment groups ($x^2$= 3.877, 1df, $p<0.05$). Both boar pheromone spray and boar urine increased the estrus detection probability, with no significant differences between the two stimuli treatments. (*Asian-Aust. J. Anim. Sci. 2001. Vol. 14, No. 6 : 765-770*)

**Key Words** : Pig, Estrus, Suckling, Weaning, Boar Pheromone, Boar Urine

## INTRODUCTION

Within Nepal, a synthetic breed of pig (the Pakhribas pig) has been developed as an alternative to local breeds in attempt to improve the efficiency of pigmeat production under rural village conditions (Shrestha, 1998). However, despite better growth characteristics, reproductive performance of this improved genotype under village conditions is much poorer than that of local breeds, and poorer than performance of Pakhrbas pigs obtained at the PAC research station in Nepal where it was developed (Gatenby et al., 1990; Shrestha and Ghimire, 1993). This poor performance may be due to inadequacies of nutrition or to poor management practices of the farmers. The experiment described here was to look at aspects of modified management which might be applied under village conditions to improve reproductive efficiency.

In the survey conducted by Shrestha (2000), it was found that almost all village farmers weaned their piglets gradually over a period of several weeks. Partial weaning can be good for the piglets, because smaller piglets can suckle for longer and with reduced competition, and helps to take the pressure off a good milking sow, which will help to minimise the weight loss and restore positive nutrient balance just before weaning (English, 1988). However, this weaning method may also give problems in the re-breeding of the sow. In general, the stimulus of the suckling piglets prevents the sow from coming back into estrus. When all of the piglets are weaned at one time, the sudden removal of this stimulus induces a rapid change in hormonal state of the sow and there will be an induction of estrus, usually within one week. When weaning takes place only gradually, the timing of estrus is less predictable and the behavioural symptoms may be less strong, making it easier for estrus to pass undetected. However, it is not practical to advise farmers to batch wean at a single time in the villages, since they are fully dependent on the availability of a market to sell their piglets in the haat bazaar.

Since the progressive weaning method does have some practical advantages under village conditions, it is desirable to find a method of allowing this to continue but also making the subsequent estrus more predictable and easier to detect. Studies have demonstrated that lactational estrus or short post-weaning intervals to estrus are induced when nursing patterns of pigs are altered (Stevenson and Britt, 1981; Stevenson and Davis, 1984). Preventing the piglets from suckling for a part of each day, is a method which could easily be applied under village conditions, and it is therefore important to establish whether such a strategy might be beneficial under

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Received October 19, 2000; Accepted December 28, 2000

Nepalese circumstances.

It is well demonstrated that estrus is more difficult to detect without boar stimuli, and that estrus may be delayed or even absent under such conditions (Hughes and Varley, 1980; English and Edwards 1996; Paterson, 1989). The survey conducted by Shrestha (2000) showed that only 52% of the farmers had a boar present on the same farm as the sow. This figure would be even lower in a survey carried out at Nepalese sites other than PAC Outreach sites. In PAC Outreach sites, one male and one female were supplied for each farmer as Nucleus Breeding Units, resulting in a greater number of breeding boars present during the survey.

In general, therefore, the presence of a boar in the villages is very unusual. Typically, there will be only one boar available in one of the villages, and therefore farmers either bring their sows to the boar or must hire the boar if the estrus of their sows is detected. Petchy and English (1980) and Hemsworth et al. (1982) reported that group housing of sows and exposure to a boar during lactation reduced the interval from weaning to re-mating for multiparous sows that did not exhibit estrus during lactation. This effect is mediated by pheromones produced by the boar in urine and saliva (Reed et al., 1974). It has been found that use of synthetic boar pheromones has been effective for estrus detection and stimulation in sows under European intensive conditions (Reed et al., 1974; Krzymowski et al., 1999). Such a product may be beneficial in Nepal in situations where a boar is not present. However, it is likely to be an expensive technology which must be imported and it is therefore desirable to see if a cheaper and readily available alternative can be found which will be equally effective. Boar urine can be readily obtained under village conditions and may offer a cheap and practical alternative stimulus.

This experiment was therefore designed to establish whether efficiency of reproduction might be improved in Nepalese circumstances by manipulating suckling management, and by using boar pheromone sources to aid sow estrus stimulation and detection.

## MATERIALS AND METHODS

### Experimental design and treatments

The experiment had two sequential elements. In part 1, a change in suckling pattern was applied during lactation, and in part 2, different estrus detection methods were evaluated after weaning.

The lactation treatments were: (i) unrestricted suckling, in which piglets had continuous access to the sow throughout lactation, and (ii) restricted suckling, in which piglets were denied access to the sow during the daytime between weaning of the first pigs in the litter (at 42 days) and final weaning (at 56 days).

After weaning, estrus detection was carried out using one of two supplementary stimuli: (i) boar pheromone spray, or (ii) boar urine. The boar pheromone spray used was a commercial product (SOA, Intervet, Boxmeer, Netherlands) which contained $\Delta$16-5d-Androsten-3-one as 0.28 mg in 75 ml DNE solvent/propellant. The boar urine was collected from mature boars maintained at a different site. It was stored in glass beer bottles which were kept at room temperature in a cupboard and used within 7 days of collection.

The methodology for the second phase of the study was designed particularly to avoid any error due to differences in the responses of individual sows in estrus stimulation. In this methodology, each stimulus was used on alternate days in the same sow. The sow was first tested in the absence of any stimulus, she was then tested with the stimulus designated for that day. In the event of a positive response, this was then confirmed by testing with a boar. The order in which the two test stimuli were given was alternated between sows. Thus, the number of days in which sows show a negative response to testing in the absence of any stimulus, but a positive response with one of the stimuli and with the boar, will indicate the beneficial effect of that test stimulus. If the two test stimuli differ in this respect, this will indicate their relative usefulness.

### Animals and management

Thirty sows of the Pakhribas genotype were selected at the beginning of their second lactation. They were housed in individual pens with an enclosed and bedded lying area and outside run. Sows were allocated between the two lactation treatments, on the basis of farrowing date, liveweight and litter size after any initial cross-fostering, to give a total of 14 sows on the unrestricted suckling treatment and 16 sows in the restricted suckling treatment group. During lactation they were fed twice daily on a commercially produced concentrate ration according to a standard scale based on liveweight and litter size.

Both treatment groups received the same pattern of weaning, which imitated the progressive weaning system used in Nepalese villages. Piglets from each litter were weaned at three ages (6, 7 and 8 weeks of age) in the proportion of 0.5 at 6 weeks followed by 0.25 at each of the subsequent weanings at 7 and 8 weeks of age. If the litter size did not give an even number, then the higher number of piglets was weaned. The heaviest piglets in the litter were selected at each weaning. In the unrestricted suckling treatment, the suckling pattern was left undisturbed, with the remaining piglets after first weaning allowed continuous suckling. In the restricted suckling

treatment, the remaining piglets after first weaning were allowed to suckle their sows only during the night, whilst in the day time (09:00-16:00) they were left free to roam around, but prevented from accessing the sow.

Estrus detection was carried out each day from the time of first weaning, using physical signs and response of the sows to the Back Pressure Test (BPT). The sow was initially tested in the absence of any stimuli, and then tested again after administration of the test stimulus designated for that day. Sows received the two different test stimuli on alternate days, with half the sows receiving boar pheromone stimulus on the first day, and half-receiving boar urine.

Boar pheromone spray or boar urine was applied as a spray towards the snout of sows for three seconds and the BPT applied for three minutes, during which time a standing reflex were taken as a positive response. Each day, all negative control tests were completed before any stimuli were applied, and all test stimuli were completed before any introduction of a boar into the vicinity. All sows showing a positive response to the BPT were subsequently checked for false positives by penning with a mature boar and observed for successful service.

**Data and statistical analyses**

Records taken for each sow included the date of farrowing, the number and weight of suckling piglets at weekly intervals and feed intake. Live weight and body condition score (0-5 scale), backfat thickness and depth of the longissimus dorsi muscle were measured at farrowing, first weaning (42 days) and final weaning (56 days). Backfat thickness and muscle depth were measured ultrasonically at the $P_2$ position using a Meritronics Livestock Grader. The daily response to BPT, date of first service and any return service, and the subsequent litter size were also recorded. The effect of suckling treatment was analysed by one way ANOVA and the effect of the different test stimuli on estrus detection was assessed using chi-square analysis.

## RESULTS

**Sow body condition changes**

The summary of sow body measures taken at farrowing and at 42 days of lactation, prior to application of treatments, and a summary of body condition measurements after application of treatments at final weaning (56 days) and at service is given in table 1.

The treatments did not differ in any parameter prior to the start of the procedure.

**Growth of the suckling piglets**

There were no significant differences between treatments in the mean liveweight of suckling piglets at different ages from birth to final weaning at 56 days of age (figure 1). The mean suckling piglet live weight gain was 0.96 and 1.0 kg from first weaning at 42 days to 49 days (sem 0.08, NS ) and 0.41 and 0.58 kg from 49 days to 56 days of age (sem 0.11, NS) for the treatment of unrestricted suckling and restricted suckling respectively.

**Effect of suckling treatment on sow rebreeding interval**

There was a significant difference in the first weaning to re-mating interval between the two different suckling treatments. The mean first weaning to re-mating interval was 22.9 and 16.9 days for the unrestricted suckling and restricted suckling treatment respectively (table 2).

All the sows were re-mated within 30 days after first weaning in the restricted suckling treatment groups, whereas only 71% of sows were remated within 30 days after weaning in the unrestricted suckling treatment groups. A $x^2$ test showed a significant difference in the proportion of sows mated within 30 days between treatments ($x^2$=3.87, df=1, $p<0.05$). The cumulative frequency of sows re-mated

**Table 1.** Sow body condition measures prior to treatment

| Treatment | Unrestricted sucking | Restricted sucking | SEM | Significance |
|---|---|---|---|---|
| At farrowing | | | | |
| Sow live weight (kg) | 103.4 | 109.7 | 3.2 | NS |
| Backfat thickness (mm $P_2$) | 18.9 | 19.1 | 1.6 | NS |
| Eye muscle depth (mm) | 59.0 | 61.9 | 2.6 | NS |
| Body condition score | 3.1 | 3.2 | 0.1 | NS |
| Litter size | 9.6 | 9.7 | 0.84 | NS |
| At 42 days | | | | |
| Sow live weight (kg) | 94.2 | 94.7 | 3.42 | NS |
| Backfat thickness (mm $P_2$) | 10.5 | 11.1 | 1.4 | NS |
| Eye muscle depth (mm) | 49.0 | 49.3 | 2.2 | NS |
| Body condition score | 2.4 | 2.4 | 0.1 | NS |

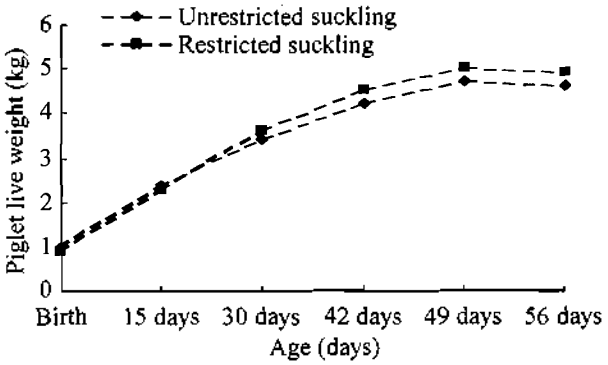


**Figure 1.** Mean suckling piglet live until full weaning by suckling treatment

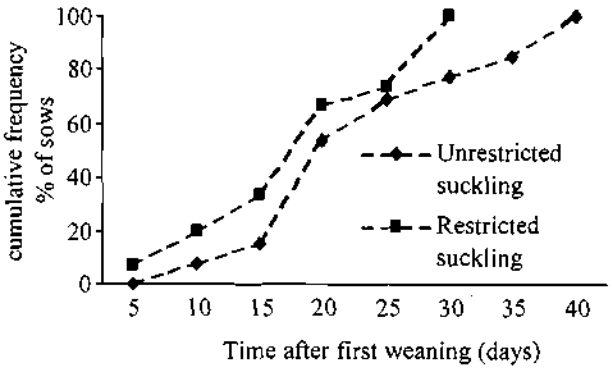


**Figure 2.** The cumulative frequency of sows remated at different times after first weaning at 42 days

after different intervals is shown in figure 2.

**Conception rate and subsequent litter size for each treatment**

Conception rate was 94% and 96% and the subsequent litter size was 9.6 and 9.7 for unrestricted suckling and restricted suckling respectively. There were no significant differences between the two treatments.

**Effect of boar pheromone stimulation treatment on ease of estrus detection**

Out of 30 sows used in the experiment, only four sows showed their first positive response to the BPT during the negative control check without additional stimulation. This suggests that the BPT alone is not an effective tool for detecting estrus in sows where no boar is present in the unit. Both stimuli therefore gave a significant advantage over the negative control in the detection of estrus.

Out of 30 sows tested, 16 sows showed positive to estrus for the first time after stimulation with boar pheromone spray, and 14 after stimulation with boar urine. All sows showing a positive response to test stimuli were mated by the boar immediately afterwards. No false positives were recorded. Therefore, no significant difference was found between the probability of response to the two different stimuli in the estrus detection of sows. The mean first weaning to remating interval was 19.6 and 19.7 days for the sows which showed estrus and mated after using boar pheromone spray and boar urine respectively (sem 2.3, NS). This showed that boar urine could be an alternative source to boar pheromone spray in order to enhance estrus detection in sows where no boars are present. The cumulative frequency of sows served at different days after weaning following a prior positive response to boar pheromone and boar urine is shown figure 3.

## DISCUSSION

**Effect of restricted suckling on sow rebreeding**

Weaning of a few piglets progressively over time is a common practice in the villages in Nepal. Partial weaning was therefore applied for both treatment groups. Partial weaning has decreased weaning to estrus interval in other European and American studies (Smith, 1961; Stevenson and Davis, 1984; Henderson and Hughes, 1984; Newton, Stevenson and Davis, 1987). However, in Nepal partial weaning takes place at a relatively later stage of lactation and continues for a long period after first weaning in comparison with Western practice.

**Table 2.** Body condition measures at final weaning (56 days) and at service

| Treatment | Unrestricted sucking | Restricted sucking | SEM | Significance |
|---|---|---|---|---|
| At 56 days | | | | |
| Sow live weight (kg) | 92.5 | 91.5 | 4.0 | NS |
| Backfat thickness (mm $P_2$) | 10.0 | 11.0 | 1.6 | NS |
| Eye muscle depth (mm) | 47.5 | 48.4 | 2.6 | NS |
| Body condition score | 2.4 | 2.4 | 0.1 | NS |
| At service | | | | |
| Sow live weight (kg) | 96.2 | 93.7 | 3.8 | NS |
| Backfat thickness (mm $P_2$) | 12.6 | 11.6 | 1.5 | NS |
| Eye muscle depth (mm) | 51.0 | 50.0 | 2.6 | NS |
| Body condition score | 2.6 | 2.5 | 0.1 | NS |

In this experiment, restricted suckling did not stimulate lactational estrus in most sows, but significantly reduced the first weaning to re-mating interval. There might be two possible reasons for achieving shorter weaning to estrus interval in sows with restricted suckling: (i) restricted suckling reduces the intensity of suckling stimulus, thereby reducing the block on LH secretion or (ii) restricted suckling reduces milk yield due to litter separation and hence allows the sow to maintain better body condition at weaning. In this present experiment, there was no significant effect of restricted suckling on the live weight, $P^2$ backfat thickness, eye muscle depth and body condition score of sows. It was expected that restricted suckling would reduce milk yield and, if the same amount of feed intake was achieved, sows would lose less live weight. However, sows with restricted suckling did not appear to benefit in body condition. This suggests that the effect of restricted suckling was not mediated by effects on body condition or metabolic state. The reduction in weaning to estrus interval was therefore likely to be associated with restriction of the suckling stimulus.

The suckling stimulus inhibits gonadotrophin synthesis and secretion during lactation (Henderson and Hughes, 1984). This inhibition decreases in potency as lactation proceeds (Stevenson and Britt, 1980; Edwards, 1982). However, Smith (1961) reported that litters separated after 31-35 days after farrowing took 13-16 days before showing estrus, but only 5-7 days for litters separated at 21 days after farrowing. In the present experiment, weaning to remating interval was higher than reported in other European breeds, which may be due to delay in application of restricted suckling. However, restricted suckling was still found to be beneficial compared to continuous suckling presently practised by the farmers in the villages.

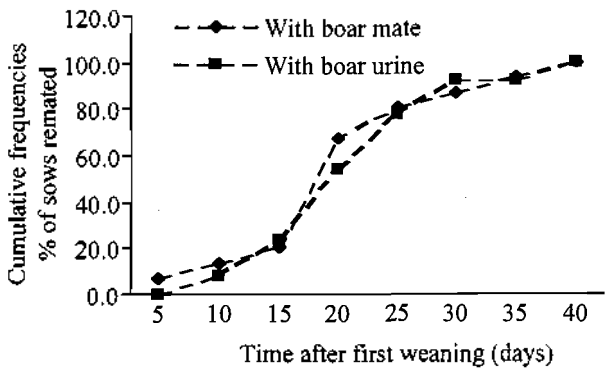


**Figure 3.** The cumulative frequency (%) of sows served by different days after first weaning, in relation to the stimulus to which they first responded in a backpressure test

**Effect of restricted suckling on piglet growth**

There was no significant difference in the litter weight as a result of restricted suckling. This result appears to be in contrast with other findings, which show that litter weights were reduced by restricted suckling (Henderson and Hughes, 1984; Newton. et al., 1987). The reason may be due to the application of restricted suckling at the older age of 6 weeks, and to the possibility for the piglets to roam around in the open area and forage. In previous Western experiments there was no access for grazing by restricted suckling piglets, which were confined in housed conditions. Also, since restricted suckling took place earlier in other experiments, the piglets would not have been as efficient in ingesting and digesting foodstuffs other than milk.

**Effect of boar stimuli on estrus detection**

The majority of the farmers in Nepalese villages do not maintain breeding boars together with sows. Under these circumstances, it was expected that some form of boar stimulus would enhance the reproductive function in pigs by either stimulating estrus or improving the ease of estrus detection by the farmers. Therefore, commercially available boar pheromone spray (Sex Odour Aerosol Spray) and locally available boar urine were used as a boar stimulus in the same experimental sows.

In this experiment, treatment with boar pheromone spray and boar urine did not induce lactational estrus in most sows, but stimuli significantly improved the detection of estrus in comparison with the BPT performed under negative control conditions. There is evidence to suggest that weaning to re-mating interval has also been reduced by the use of boar presence during lactation (Cole et al., 1972; Petchy and English, 1980). Such an effect is appears to be due to a direct stimulation of gonadotrophin release resulting from boar presence (Henderson and Hughes, 1984).

In the present study, there was no significant difference between the boar pheromone spray and boar urine in influencing probability of detection of estrus in sows. It therefore can be argued that boar urine can also be effectively used as boar stimulus in order to facilitate the detection and possibly also stimulation of estrus in sows where there is no boar presence. Boar urine can be collected from a mature boar easily and stored for a week in a beer bottle, which can be stored at room temperature, and then can be applied regularly as an estrus stimulus in sows after weaning the piglets. This simple technology is easily applicable under village conditions.

## CONCLUSION

Under Nepalese conditions, restricted suckling is a

most appropriate technique for reducing weaning to estrus interval in sows without additional cost to the farmers. Application of a boar pheromone stimulus can significantly improve estrus detection in the absence of a boar. Boar urine may be an equally acceptable alternative to commercial boar pheromone spray and this needs further critical evaluation under village conditions.

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