EFFECT OF EARLY WEANING ON POSTPARTUM RESUMPTION OF REPRODUCTION IN MOTHER BUFFALOES AND GROWTH OF THEIR CALVES

An experiment to determine effect of early weaning (EW) on postpartum resumption of reproduction in mother buffaloes and growth of their calves was carried out concurrently in 2 localities in North Vietnam, viz. Ha Nam and Phu Tho, with different grazing conditions. In each locality, 12 buffalo-calf pairs were equally allocated into 2 groups of 6 pairs each; in one group calves were allowed to suck their mothers as long as they could according to the traditional practice (control group) and in the other group (EW) calves were weaned at 120 days post calving (experimental group). Results

SUMMARY

An experiment to determine effect of early weaning (EW) on postpartum resumption of reproduction in mother buffaloes and growth of their calves was carried out concurrently in 2 localities in North Vietnam, viz. Ha Nam and Phu Tho, with different grazing conditions. In each locality, 12 buffalo-calf pairs were equally allocated into 2 groups of 6 pairs each; in one group calves were allowed to suck their mothers as long as they could according to the traditional practice (control group) and in the other group (EW) calves were weaned at 120 days post calving (experimental group). Results

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Key word: Buffalo, calf, early weaning, growth, reproduction.

1. INTRODUCTION

In Vietnam, almost all buffaloes belong to small holders. After birth, the calf is allowed to follow its mother suckling until 1-2 years old because the farmer has no way to wean the calf. That may be one of the reasons for long calving intervals in buffaloes as it has been proven that suckling causes delayed postpartum resumption of ovarian activity (Lamb et al., 1997) and removal of the nursing calf results in hormonal changes in the buffalo that stimulate estrus (Short et al., 1990, Lamb et al., 1999). Beside hormonal changes, buffaloes must have energy to support all bodily activities, but some functions have a higher priority for energy use than others. Buffaloes can only direct energy toward resuming the estrous cycle after calving if energy exceeds the combined...
requirements for maintenance, growth and lactation (Rae et al., 1993). This is why body condition is strongly related to the length of the postpartum anestrous period in beef cattle (Laster, 1973; Houghton et al., 1990). Since body condition influences reproductive performance, early weaning (EW) or restricted suckling can be utilized to improve the chance that a buffalo is in an proper body condition and thus reproduction post calving.

As far as the calf is concerned, the quantity of mother milk in late lactation is very low and thus energy supply is not enough for calf growth. In addition, the suckling reflex inhibits the feeling of hungry, and this will lead to the result that the calf will be very thin and emaciated. At the same time, if the calf is weaned late, the rumen should develop very slowly because the main feed is mother’s milk. When the calf begins to eat dry feed, the rumen begins to supply nutrients produced by fermentation and the population of rumen bacteria begins to grow. The rumen bacteria themselves also provide an important source of protein as they are washed out of the rumen, digested, and absorbed in the small intestine. Microbial protein is highly digestible and contains a favorable profile of amino acids relative to the needs of the growing calf. This is the reason why the sooner dry feed is digested by the calf, the sooner rumen development occurs and early weaning improves cow-calf performance (Randel, 1981; Peterson et al., 1987).

However, the above mentioned effects of early weaning have been so far shown from studies on cattle. Therefore, the present study was undertaken to test the hypothesis that early weaning of the calf could also shorten the postpartum interval in the mother buffalo and enhance growth of the calf due to better grass intake and digestion.

2. MATERIALS AND METHODS

The study was carried out from February to August 2010 concurrently in 2 provinces in North Vietnam, viz. Ha Nam (Boi Cau commune, Binh Luc district) and Phu Tho (Huong Nha commune, Tam Nong district), with different grazing conditions. In Ha Nam natural green grass was abundantly available; whereas, in Phu Tho buffaloes were suffering from harsh grazing conditions. In each of the two localities, 12 buffalo-calf pairs were selected and equally allocated into 2 groups of 6 pairs each:

**Group 1 (NW):** Calves were allowed to suck their mothers as long as they could according to the traditional practice (the control).

**Group 2 (EW):** Calves were weaned at 120 days post calving, using a plastic anti-suckling device until they completely forgot suckling (Figure 1), being allowed to follow their mothers to graze.

In each site, as it was not possible to select all 12 mother-calf pairs at one time, whenever two pairs were found to be similar in terms of parity (second to third calving), calving time (within 2 week), body condition of the mothers (±0.25 score), and birth weight of the calves (±2.0 kg), they were selected to put into the two groups to be monitored. Only 12 those mother buffaloes not found having returned to heat within 4 months post calving were used for the purpose of the present study.

![Figure 1. Plastic anti-suckling device](image-url)
In both groups, the mother buffaloes were allowed to graze natural grass along road sides and common lands together with their calves as traditionally practiced. Grazing time of the calves was recorded individually 2 days a week from 120 days of their age. The calves were weighed at 120 days of age and every 15 days for three months thereafter. The mother buffaloes were daily observed for heat until 210 days postpartum by the owner based on the signs of heat and the mounting of the bull during grazing. After detecting a mother buffalo showing standing heat, the farmer found a bull from elsewhere for mating or let it mated directly by bulls available on the common grazing area. Heat observation was continued and re-breeding was applied if the buffalo showed heat again. Pregnancy was detected by rectal palpation from 65 to 110 days after breeding.

Data were subjected to analyses of variance (ANOVA) for a 2 x 2 factorial model with interactions using the General Linear Model (GLM) of Minitab 16. Pair-wise comparisons of means were done using the Tukey method.

3. RESULTS AND DISCUSSION

Table 1 shows effects of EW on postpartum resumption of reproduction in mother buffaloes and growth of calves at two different localities. Statistical analyses show that EW had a strong effect (P<0.001) on the time from calving to first estrus, reducing it by 24.8 days in Phu Tho and 48.2 days in Ha Nam. Similarly, the time from calving to conception was shortened by 32.8 and 46.7 days, respectively, in the two localities as a result of EW (P<0.01). The resumptions of estrus and conception were also influenced by locality (P<0.05). The interaction between EW and locality was also significant (P<0.05), indicating that the effects of EW on postpartum resumption of reproduction in buffaloes would depend on the locality or, in other words, the feeding condition.

It can also be seen from Table 1 that live weight gain of the calves was strongly affected by locality (P<0.001), indicating the importance of grazing conditions. However, EW did not significantly (P>0.05) affect weight gain of the calves when calculated for a long time (75 days of weaning). Nevertheless, a closer observation on growth pattern of the calves after weaning (Table 2) shows that EW did significantly influence the growth pattern of the calf. Right after weaning average daily gain (ADG) of the calves was dramatically reduced compared to those not weaned (NW), but later on ADG of the EW calves gradually increased and reached a level higher than that of the NW calf after a certain time (one month) of weaning. This can be explained that after weaning the calf received no nutrients from the mother’s milk with a nutritionally stressful period during which it had to rely on grazing for living, resulting in retarded growth. However, when the calf overcame this stressful period, it became adapted to the new living condition and resumed weight gain. The EW calves grew very fast then, even faster than the NW, and as a result, they became heavier later on (Figure 2) (should be all in plural: calves).

### Table 1. Effects of early weaning (EW) on postpartum resumption of reproduction in mother buffaloes and growth of their calves in two different localities

<table>
<thead>
<tr>
<th></th>
<th>Phu Tho</th>
<th>Ha Nam</th>
<th>SEM</th>
<th>Factor significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With EW</td>
<td>Without EW</td>
<td>With EW</td>
<td>Without EW</td>
</tr>
<tr>
<td>Calving to 1&lt;sup&gt;st&lt;/sup&gt; estrus (days)</td>
<td>173.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>198.0&lt;sup&gt;*&lt;/sup&gt;</td>
<td>150.5</td>
<td>198.7&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Calving to conception (days)</td>
<td>177.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>209.8&lt;sup&gt;*&lt;/sup&gt;</td>
<td>155.8</td>
<td>202.5&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Calf weight at 120 days of age (kg)</td>
<td>81.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>79.2&lt;sup&gt;*&lt;/sup&gt;</td>
<td>92.7&lt;sup&gt;*&lt;/sup&gt;</td>
<td>93.0&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Calf weight at 195 days of age (kg)</td>
<td>117.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>117.3&lt;sup&gt;*&lt;/sup&gt;</td>
<td>146.9</td>
<td>145.9&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Calf weight gain from 120 to 195 days of age (kg)</td>
<td>35.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>38.1&lt;sup&gt;*&lt;/sup&gt;</td>
<td>54.2&lt;sup&gt;*&lt;/sup&gt;</td>
<td>52.9&lt;sup&gt;*&lt;/sup&gt;</td>
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</table>

NB. Means in the same row that do not share a letter are significantly different.

***: P<0.001; **: P<0.01; *: P<0.05; NS: non-significant.
Table 2. Effect of early weaning (at 120 days of age) on the average daily gain (ADG) of calves at two different localities (g/head/day)

<table>
<thead>
<tr>
<th>Calf age (days)</th>
<th>Phu Tho With EW</th>
<th>Phu Tho Without EW</th>
<th>Ha Nam With EW</th>
<th>Ha Nam Without EW</th>
<th>SEM</th>
<th>Weaning</th>
<th>Locality</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-135</td>
<td>294.4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>516.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>494.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>772.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13.6</td>
<td>***</td>
<td>***</td>
<td>NS</td>
</tr>
<tr>
<td>135-150</td>
<td>394.4&lt;sup&gt;d&lt;/sup&gt;</td>
<td>472.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>605.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>688.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.2</td>
<td>***</td>
<td>***</td>
<td>NS</td>
</tr>
<tr>
<td>150-165</td>
<td>483.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>450.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>738.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>638.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>32.9</td>
<td>NS</td>
<td>***</td>
<td>NS</td>
</tr>
<tr>
<td>165-180</td>
<td>572.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>500.0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>850.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>672.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>27.4</td>
<td>***</td>
<td>***</td>
<td>NS</td>
</tr>
<tr>
<td>180-195</td>
<td>638.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>605.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>927.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>755.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>24.7</td>
<td>***</td>
<td>***</td>
<td>*</td>
</tr>
</tbody>
</table>

NB. Means in the same row that do not share a letter are significantly different. ***: P<0.001; **: P<0.01; *: P<0.05; NS: non-significant.

Figure 2. Growth pattern of buffalo calves with and without early weaning in Ha Nam
Figure 3 shows changes in grazing time of the calf after weaning, that can help explain the earlier mentioned changes in ADG and live weight. The most critical time was the time right after weaning as the calf had to overcome the stress of weaning. In the first weeks of weaning, the EW calves spent less time grazing than the NW ones. That was probably because at the beginning of weaning, the EW calves had to wear the anti-suckling device on their nose, which was not comfortable for the calves to graze. However, when the EW calves forgot suckling and the device was removed, they spent more and more time grazing to meet their nutritional demands, and from 4 weeks of weaning on the EW calves spent longer time grazing than the NW, indicating that when relying on the mother’s milk the NW calves did not feel so hungry to graze as much as the EW. Since the EW calves consumed more grass and utilized it better their growth rate was higher than that of the NW in the long run.

4. CONCLUSIONS

Early weaning is an effective way to shorten postpartum resumption of reproduction in mother buffaloes and enhance growth of their calves after a short period of nutritional stress.

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