

## Sucking position and duration in natural and adopted calves

H. D. Randle

Department of Agriculture and Food, Seale-Hayne Faculty, University of Plymouth, Newton Abbot TQ12 6NQ

### Introduction

It is possible for domesticated beef cattle to adopt an additional calf. A method of double suckling in which the additional calf is adopted by the cow was developed by Kiley-Worthington (1976). This method differs from those such as multiple suckling (e.g. Hudson, 1977) which are based on fostering and often require substantial amounts of human resources. It is well known that suckling plays a fundamental rôle in the reinforcement of the mother-young bond in cattle (Le Neindre, 1982). In the case of double suckling it is particularly important that the additional calf (the adoptee) is permitted to suck. However, to achieve this the adoptee must behave appropriately to ensure acceptance by the dam. Most cows will not allow calves other than their own natural calves to suck them (Price *et al.*, 1986). Once the natural calf starts suckling, milk is let down by the cow (Orihuela, 1990) and is potentially available to the adoptee. There is some evidence that adoptee calves employ an 'opportunistic' strategy in order to obtain milk. One aspect of this is the initiation of suckling bouts. Adoptees learn to synchronize their suckling with that of the natural calf, i.e. they wait for the natural calf to suck before starting to suck themselves. The typical position assumed by a single suckling, natural calf is 'parallel inverse', where the calf's head faces the mother's tail and there is maximum body contact between the dam and calf (Le Neindre, 1982). However, Spinka and Illman (1992) report that adopted calves do not assume this position. A typical suck position taken up by alien calves is between the cow's hind legs, a position frequently assumed by single suckling, natural, calves near the end of a suckling bout (Le Neindre, 1982). Suckling duration typically declines with increasing calf age (Le Neindre, 1982; Kiley-Worthington and de la Plain, 1983; Nakanshi *et al.*, 1993). The work reported in this paper aims to compare the suckling positions and durations achieved by adopted calves with those exhibited by the natural calves.

### Material and methods

A total of 13 trios were observed, each consisting of a South Devon cow, her homebred natural calf and an adopted calf. Adoptions were carried out using the

method developed by Kiley-Worthington (1976). For further details see Randle (1996b).

In group 1, six trios were observed for the 1st week of the adoption and week 3 post adoption. In group 2, seven trios were observed during the 1st week of the adoption and for the 1st week of month 5 post adoption. These observation periods covered all suckling sessions which occurred between 06.00 and 21.00 h. Observations included all of the behaviours exhibited by the dam and both the natural and adopted calves. These were recorded simultaneously. The full list of behaviours recorded during a suckling session is given in Randle (1999b). All of the different positions assumed by both the natural and adopted calves (for at least 5 s) throughout a suckling session were recorded. Suckling positions were categorized as inside — focal calf (where the focal calf was either the natural or the adoptee whichever was being recorded) on the inside of the other calf, parallel and adjacent to the dam, or outside — focal calf on the outside of the other calf, parallel but not adjacent to the dam, or suckling from between the dam's hind legs. The suckling duration exhibited by both calves in each position was also recorded.

At the end of the four observation periods the success of the adoptions were rated using the five-point system developed by Kiley-Worthington and de la Plain (1983). The detailed descriptions of R (rejected), F1 (level one fostering), F2 (level two fostering), A1 (level one adoption) and A2 (level two adoption) are given by Randle (1996b).

The proportion of suckling time spent in the inside suckling positions by naturals and adoptees was subjected to ANOVA. The durations of suckling by naturals and adoptees in the inside and outside positions were subjected to a two-way ANOVA. Two further three-way ANOVAs were performed in order to examine the influence of calf type (natural, adoptee), suckling position (inside, outside) and time (week 1, week 3 in group 1; week 1, month 5 in group 2) on suckling duration.

**Table 1** Proportion of suckling time spent in the inside positions by natural and adopted calves (upper) and mean suckling duration (min) exhibited by natural and adopted calves in the inside and outside sucking positions (lower) for both group 1 and group 2

Suckling	Natural calves	Adopted calves	Significance		
Proportion of time inside					
Group 1	0.92	0.33	***		
Group 2	0.74	0.31	***		
Duration of sucking					
	Inside	Outside	Inside	Outside	
Group 1	5.49	1.48	3.55	3.30	*
Group 2	4.99	2.05	3.13	2.62	*

## Results

At the end of the 1st week of the adoption 12 of the 13 adoptions were considered to be successful, i.e. the cow had 'adopted' the second calf and no human intervention was necessary to ensure successful suckling (see Table 1: Randle, 1999b).

In total 409 suckling sessions were observed, in group 1, 107 during week 1, 94 during week 3 and in group 2, 134 during week 1 and 74 during the 1st week of month 5. In both groups the natural calves spent a significantly greater proportion of time suckling from the inside positions (inside the other calf, parallel and adjacent to the dam) than the adopted calves ( $P < 0.001$ ) (Table 1). In both groups there was a significant interactive effect of calf type (natural, adoptee) and sucking position (inside, outside) on the duration of sucking ( $P < 0.05$ ). The natural calves sucked for significantly longer when in the inside positions compared with adopted calves in either the inside or outside positions ( $P < 0.05$ ), whilst the adopted calves exhibited significantly longer suckling durations when in the outside positions (outside of the natural calf, not adjacent to

the dam, or between the dam's hind legs) than the natural calves when they were in the outside positions ( $P < 0.05$ ) (Table 1). There was a significant interactive effect of calf type (natural, adoptee), sucking position (inside, outside) and time (week 1, week 3) in group 1 but not in group 2 (Table 2). The adoptees achieved their longest, uninterrupted suckling durations in week 3 post adoption when suckling from the outside positions.

## Discussion

### Double suckling with adoption

The double suckling with adoption method used was successful. One of the 13 adoptions failed, although the additional calf was allowed to suck if the dam was under close human supervision.

### Suckling positions and durations

The suckling behaviour of all of the calves studied was typical of calves in a beef suckler system. Since the adopted calves always sucked at the same time as the natural calves it can be concluded that the welfare of the adoptees was not compromised by being reared by an adoptive dam (Lidfors *et al.*, 1993). At week 3 post adoption the differentiation of sucking positions assumed by natural and adoptee calves was pronounced. Natural calves sucked from the typical parallel, inverse, positions (Le Neindre, 1982) which afforded maximum bodily contact with the dam, whilst the adoptee calves sucked from positions resulting in less bodily contact with the dam, usually on the outside of the natural calf. It appears that the adoptees learnt that it was more effective to suck from the outside positions and utilized this as part of an opportunistic strategy (coupled with waiting for the natural calf to initiate the suckling, see Randle (1999b) to obtain milk. This suggestion is supported by the longer suckling durations achieved by adoptees when in the outside positions at week 3 post adoption when the trio was not subject to human supervision. The non-significant interaction between calf type, suckling

**Table 2** Mean suckling duration (min) exhibited by natural and adopted calves, in the inside and outside sucking positions in week 1 (groups 1 and 2) and week 3 (group 1) and the 1st week of month 5 (group 2) of the adoption

Group	Natural calves		Adopted calves		Significance
Group 1					
Duration of sucking (min)	Week 1	Week 3	Week 1	Week 3	
Suckling in inside position	4.85	6.14	4.18	2.93	
Suckling in outside position	1.99	0.96	2.34	4.25	*
Group 2					
Duration of sucking (min)	Week 1	Week 1, month 5	Week 1	Week 1, month 5	
Suckling in inside position	4.74	5.24	3.75	2.51	
Suckling in outside position	2.62	1.48	2.67	2.57	

position and time (week 1 *v.* the 1st week of month 5 post adoption) in group 2 was likely to have been due to occurrences of cross sucking (Randle, 1999a).

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