Reactions of calves to handling depend on housing condition and previous experience with humans

B.J. Lensink\textsuperscript{a,1}, S. Raussi\textsuperscript{b,c}, X. Boivin\textsuperscript{a}, M. Pyykkönen\textsuperscript{b}, I. Veissier\textsuperscript{a,*}

\textsuperscript{a}INRA, Centre de Clermont-Ferrand-Theix, Unité de Recherches sur les Herbivores, 63122 Saint-Genèse Champanelle, France
\textsuperscript{b}MTT Agricultural Engineering Research Väkola, 03400 Vihti, Finland
\textsuperscript{c}University of Helsinki, Faculty of Veterinary Science — Animal Hygiene, 00014 Helsinki, Finland

Accepted 29 May 2000

Abstract

This study investigated the influence of stockperson’s behaviour and housing conditions on calves’ behavioural reactions to people, and behavioural and physiological reactions to handling and short transport. Sixty-four Finnish Ayrshire male calves were used; half of them were housed in individual pens, the other half were housed in group pens of two calves. In both housing conditions half of the calves received minimal contact from the stockperson, while the other half were stroked on their necks and shoulders for 90 s a day, after milk meals. The effects of housing and contact with the stockperson on the responses of calves to people, either entering or approaching the pen, were studied. Furthermore, calves’ behavioural and physiological (cortisol, heart rate) reactions to being loaded onto a truck, transported for 30 min and unloaded were observed. When a person entered the home pen, calves housed by pairs took significantly more time to interact and interacted less frequently with the person than individually housed calves did (p<0.01). Calves that received additional contact interacted for longer time with the unfamiliar person than calves with minimal contact (p<0.02). When a person approached the front of the calves’ pens, less withdrawal responses were shown by calves that had received additional contact (p<0.05) than those that had received minimal contact. When the calves were loaded onto the truck, it took more time and effort to load pair housed calves than individually housed calves (p<0.01) and less effort to load calves that had received additional contact (p<0.01) compared to those that had received minimal contact. During loading additional contact calves had lower heart rates (p<0.05) than those that had received minimal contact, while during transport pair housed calves had lower heart rates compared to individually housed ones (p<0.05). For all the observations performed, no interactions were found between housing conditions and human contact.

\textsuperscript{1}Present address: Institut Supérieur d’ Agriculture, 59046 Lille, France.
It is concluded that, compared to calves housed individually, calves housed in pairs are less ready to approach humans and less easy to handle. Providing calves with regular positive contacts makes them less fearful of people and improves handling. Due to the greater difficulty in handling calves housed in groups, it is concluded that these animals need to have regular contact with humans. © 2001 Elsevier Science B.V. All rights reserved.

**Keywords:** Cattle-handling; Human–animal relationships; Handling; Heart rate; Housing

### 1. Introduction

The farm animals’ response to humans is greatly influenced by the stockperson’s behaviour towards them. Animals are more fearful of someone who has treated them aversively (e.g. use of an electric prod) than someone who has never interacted with them or petted them (pigs: Hemsworth et al., 1986; Hemsworth and Barnett, 1991; dairy calves: de Passillé et al., 1996). Similarly, veal calves given additional positive contact (petting, letting suck the fingers) have reduced withdrawal responses and increased approach to both familiar and unfamiliar people, compared to calves with minimal human contact (Lensink et al., 2000a).

It can be supposed that these responses to humans greatly determine the animals’ response to handling procedures like weighing or loading for transport (Gonyou, 1994). Calves housed individually and given additional positive contact (petting, letting suck the fingers) are less agitated during transit in a cart, compared to calves with minimal human contact (Lensink et al., 2000b). Boissy and Bouissou (1988) reported that brushing heifers and leading them with a halter during the first 9 months of life increased consequently their ease of handling and reduced their capturing time. Similarly, extra handling during the rearing of beef cattle has been found to reduce difficulties in handling (Boivin et al., 1992a,b). However, in other studies, animals regularly petted were not found easier to handle than control ones (pigs: Grandin, 1987; Geverink et al., 1998). This discrepancy in findings could be due to the social environment in which the animals were reared. Trunkfield et al. (1991) reported that calves housed in groups of 15 were less easy to load into a truck than individually housed calves, and Veissier et al. (1998) observed that calves housed in groups of four were more agitated when handled for weighing than individually housed ones. Pearce et al. (1989) suggested that having regular contact with animals reared in groups lead to reduced effects on their response to humans, compared to animals housed and provided contact individually. We hypothesise that for animals reared individually, contacts with the stockperson are more salient, because they are housed in a poorer environment, whereas for animals in groups, the presence and contact with humans are overridden by the presence of peer animals (Veissier et al., 1998).

Due to increased public concern and European legislation (EEC-directive 97/2/CE), the rearing of veal calves in Europe is changing from predominantly individual crate rearing to rearing in group pens of variable sizes (2–40 animals). Together with this development, the number of animals the stockperson has to deal with is generally increasing, and therefore the contact with the animals is likely to reduce. The interactions that remain between the
stockperson and the animals could be considered as mainly negative, like, for example, medical examinations or when taken for weighing or transport. These changes in rearing conditions could increase the animals’ reactions to being handled, and might therefore induce stress reactions during transport for slaughter, and could have serious consequences on meat quality by increasing the incidence of carcass bruising or increased meat pH (Gregory and Grandin, 1998). Therefore, it appears that providing additional positive contact with the stockperson during rearing of group housed animals is needed in order to overcome these problems.

The aim of our study was to investigate the effects of additional positive contact during rearing on calves housed individually or in pairs, on their responses to people and handling. The calves’ behavioural responses towards people and handling were observed in three situations, which could represent similar actions performed during (veal) calf husbandry: (1) a person entering the pen, e.g. for medical treatment, (2) a person approaching at meal time, as contacts with people most commonly occur at feeding, and (3) a person moving them for transport, normally occurring at the end of the rearing period. Furthermore, the calves’ physiological reactions during transport were determined. It was hypothesised that pair housed calves would be less motivated to interact with people, would show more fear responses to them and would be less easy to handle compared to individually housed ones. It was also suggested that providing additional positive contact with the stockperson would improve these responses. Interaction effects were expected, in that way that additional positive contact would have the biggest effect on the responses of individually housed calves, and that calves housed in pairs without additional contact would perform less during the observations including humans.

2. Materials and methods

2.1. Animals and management

The experiment was performed at the Lintupaju farm of MTT Jokioinen, Finland. A total of 64 male Finnish Ayrshire calves were used, in four batches of 16 calves, from autumn 1997 until autumn 1999. Calves originated from two experimental farms of MTT where they were kept with their dam for 3 days after birth, and afterwards kept in individual boxes. All calves learned to drink from a teat bucket with human assistance within 2 days, by leading the calves to the bucket and using the caretaker’s fingers to induce milk ingestion. Calves were moved for each batch all at the same day to the experimental building at 15.9±1.3 (mean±standard error) days of age (range: 8–25 days). Until transit to the experimental building, the caretaker was instructed not to pat or stroke the calves. Lights were on in the experimental building from 06.00 to 18.00 h. Calves were fed twice daily (07.00 and 15.00 h) milk replacer from teat buckets. Calves had free access to concentrates and hay, and water from a nipple. The health of the calves was monitored daily during feeding and appropriate medical treatments were given, all by oral administration. The origin of the calves (experimental farm), their age and weight at arrival were balanced over the treatments.
2.2. Housing

In the experimental building, half of the calves were housed in individual pens of 1.20 m × 1.80 m, and the other half were housed in group pens of two calves, group pens having twice the size of an individual pen, 2.40 m × 1.80 m. Both individual and group pens had wooden slatted floors (slats 10 cm, slots 2 cm) and they were littered down daily with wood shavings, without the stockperson entering the pens. Pens were separated from each other by open wooden partitions of 120 cm high with slots of 10 cm, through which the calves could see and sniff their neighbours.

2.3. Contact treatments

Half of the calves in each housing condition (individual and group pens) received additional contact (AC) with the stockperson after the morning and evening meals, from their arrival at the experimental barn until 4 months of study. Twenty minutes after a calf had started to drink, the stockperson took the bucket away and slowly stretched his/her arm to touch and stroke the calf’s neck and shoulders, while speaking softly to the calf, for 60 s. While being petted the calf was allowed to suck the stockperson’s hand. These contacts have been previously described as positive, as they increased calves’ motivation to interact and reduced withdrawal from people (Lensink et al., 2000a). After the evening meal, human contact lasted 30 s. This contact was given for 5 days a week by the stockperson working that day. The remaining calves, referred to as minimal contact (MC) calves, received no additional human contact after feeding. For all calves, plywood partitions were situated in front of the feeding barrier to prevent any contact with other calves while feeding, and to ensure individual contact treatments with the stockperson.

For each batch, two stockpersons, a woman and a man, took care of the calves alternately and both wore light-blue coloured overalls. Both stockpersons, for each batch, worked an equal number of days and gave an equal number of days additional contact. During all the four batches, the same woman (165 cm tall), but three men (first two batches: same man, 170 cm tall; third batch: 165 cm tall; fourth batch: 175 cm tall) took care of the calves. Stockpersons were instructed on how to have contact with the animals before the study began. Until the performance of the first behavioural test, no people other than the stockpersons, were allowed to enter the calves’ room.

2.4. Behavioural tests and observations

In some cases, cattle have been reported to associate colours of overalls with a handling treatment (Munksgaard et al., 1999). In order to observe the calves’ responses to people in general and not to a specific colour worn by the stockpersons, the persons involved in the behavioural tests wore differently coloured overalls.

2.4.1. Reactions to an unfamiliar person in the home pen

On day 82 of treatment, between 10.00 and 12.00 h, an unfamiliar person (woman, 165 cm tall, wearing a brown coloured overall) entered the pen of the calf to be tested, and
stood for 2 min motionless, with her hands in her pockets, to the middle of the side where the feeding barrier was situated. In order to observe the calf’s individual response during the test, the calves housed in pairs were separated 1 h before being tested with a solid plywood plate of 120 cm high. This divided the group pen into two parts with the similar size as the pens for the individual housed calves. No entrance of the stockperson in the pen was needed for placing the separation. Pairs had been habituated to these plates, and therefore to separation, during 4 h daily for 5 days during the week preceding the test. The order of testing was balanced with respect to the treatment. The test was video recorded. Recordings were analysed after completion of the tests for all calves using The Observer software package (Noldus, The Netherlands). The following variables were calculated: latency to first contact the person(s), and frequency and duration of the interactions with the person(s), whereby the interactions included sniffing, licking, and nibbling the overalls.

2.4.2. Reactions to an unfamiliar person in front of the pen

On day 85 of treatment, the calves’ responses to a new person (man, 185 cm tall, wearing a red coloured overall) were observed during the morning meal, in a similar way to that described by Lensink et al. (2000a). During this meal, the teat buckets with milk were distributed by the stockperson as usual. Ten seconds after a calf had started to drink from the bucket, the unfamiliar person approached from the side and stood motionless facing the calf, 0.5 m behind the bucket. The first reaction of the calf to the appearance of this person was noted as 1 — withdrawal or 2 — no reaction, whereby withdrawal was defined as stepping back from the bucket, and passing the head through the feeding barrier. The calf then was given a maximum of 10 s to resume drinking. If the calf did not resume drinking within 10 s after the appearance of the person, the test was stopped. If the calf resumed drinking, the unfamiliar person slowly lowered his right hand to try to touch the forehead of the calf and slowly removed his arm immediately after touching. The reaction of the calf was noted as 0 — no reaction or 1 — withdrawal. The latency to resume drinking after the touch movement was recorded, and truncated at 10 s if the calf failed to resume drinking after touch.

2.4.3. Reactions to individual loading onto a truck and short transport

On day 106 of treatment, calves’ behavioural and physiological reactions were observed during loading to a conventional slaughter truck, then during a 30 min transport and finally unloading. For each batch, four transport sessions were performed, where the four calves from a same treatment were loaded individually. Loading was performed from the calves’ room to a truck over a distance of 35 m through a 2 m wide alley, by two truck drivers (wearing both dark blue coloured overalls) who were experienced animal handlers. The truck drivers, both men, were only allowed to push and to use their voice for moving forward the animals if they stopped for more than 2 s. The time needed to load a calf was calculated from the moment when it left the calves’ room to the moment when it put the two front legs on the ramp of the truck. Number of pushes performed during the loading, time to load the animals (s), time spent running (s), and number of buck-kicks was noted. Furthermore, the effort needed to load the calves was expressed as (frequency of pushes during loading)/(loading time).
The four calves were then transported together for 30 min in the same compartment of the truck. The space allowance was approximately 1.5 m² per calf. After transport, the calves were unloaded individually from the truck and led back to the calves’ room, over the same distance and through the same alley as during loading. The time needed for unloading was calculated from the moment of leaving the ramp of the truck (no legs on the ramp) to the moment when the calf put both front legs in the calves’ room. The same variables were noted as during loading.

During loading, transport and unloading the heart rate of the calves was monitored by using a Polar Advantage Tester (Polar Electro Oy, Finland). The electrode belt and monitor were placed on the calves 30 min before loading. Placing the belt took an average of 2 min per calf. The monitor was set to record mean heart rate every 5 s. Owing to technical problems, the heart rate could not be recorded for 10 out of the total 64 calves (two calves for both individual housing treatments, and three calves for both group housing treatments). Heart rates were calculated for the following periods: 10 min before blood sampling (see below), loading, 30 min transport, unloading and 5 min after unloading in their home pen.

One minute before loading, 5 min after the transport when still in the truck and 2 h after unloading, a blood sample was taken from the jugular vein to determine the plasma cortisol concentrations. Samples were taken by venepuncture and were immediately centrifuged for 5 min at 3000 × g. The plasma was separated into 2.5 ml aliquots, and stored at −20°C until analysis. Plasma levels of cortisol were determined by radioimmunoassay with an antibody produced on rabbits by Cognié and Poulin (INRA Tours, France). The detection limit was 0.02 ng/ml. Within- and between-assay coefficients of variation were 19.6 and 8.1% for low (2 ng/ml) and 4.3 and 8.2% for high (32 ng/ml) controls.

2.5. Statistical analysis

Statistical analyses were performed using the SAS 6.12 statistical package (SAS Institute Inc., USA). When a Gaussian distribution and homogeneous variances were likely, the general linear model was used to assess the effects of housing (individual pen versus group pen), contact (minimal contact versus additional contact) and their interaction. As the study was performed in four batches, batch was also included in the model. For the test performed in the pens, order of testing was included in the model. For the analyses of the heart rates at loading, during transport, unloading and after unloading, the basal heart rate was included as a co-variable in the model. For data from calves housed together in pairs, the average of the two animals was calculated, and this was considered as a single observation. Because these data were means and the variance of a mean of \( n \) units is \( \sigma^2/n \), the number of calves per mean was used as a weighting in the analysis (one for individually housed calves, two for calves housed in pairs). This makes the observations with heavier weight or higher precision more important than the others, thus correcting for the imbalance of the design. Logarithmic transformation was used when a normal distribution or homogeneity of the variances could not be assumed on raw data. The \( t \)-test for paired data was performed to determine the effect of transport on cortisol level. Fisher-exact values were calculated on qualitative data, not averaged in pens (Siegel and Castellan, 1988). When means are indicated the standard error (S.E.) is given.
3. Results

3.1. Reactions to an unfamiliar person in the home pen

After entrance of the unfamiliar person into the calf’s pen, calves housed individually interacted faster and more frequently with the unfamiliar person compared to pair housed calves \( (p<0.01, \text{ Table 1}) \). Calves having received additional contact interacted for longer with the person, compared to calves with minimal contact \( (p=0.02) \), while pair housed calves tended \( (p=0.07) \) to interact for less time with the person compared to individually housed ones. No interaction between housing condition and contact was found.

3.2. Reactions to an unfamiliar person in front of the pen

At the approach of an unfamiliar person during their milk meal, no significant effect of housing or contact treatment was found on the number of calves that showed a withdrawal response \( (\text{ Table 1}) \). All calves resumed drinking within 10 s after appearance of the person. When the calves were touched by the unfamiliar person, calves that had received additional contacts showed less withdrawal responses \( (p=0.01) \) and had a shorter latency \( (p=0.04) \) to resume drinking after being touched compared to the calves with minimal contact.

3.3. Reactions to individual loading onto a truck and short transport

Significantly more pushes and more time was needed to load and unload pair housed calves \( (\text{ Table 2}, p<0.01) \) than individually housed ones and less effort was needed to load calves that had received additional contact than for the ones that had received minimal contact.

Table 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Individual housing( ^a )</th>
<th>Group housing( ^a )</th>
<th>S.E.M. Main effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MC( ^b )</td>
<td>Ac( ^b )</td>
<td>MC( ^b )</td>
</tr>
<tr>
<td>Latency to first interaction (s)</td>
<td>11.3</td>
<td>9.2</td>
<td>35.7</td>
</tr>
<tr>
<td>Total time interacting (s)</td>
<td>72.3</td>
<td>96.7</td>
<td>68.6</td>
</tr>
<tr>
<td>Frequency of interactions</td>
<td>12.6</td>
<td>14.6</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Unfamiliar person in the pen

Withdrawal at approach (no. calves)\( ^c \)

\( 3 \quad 1 \quad 1 \quad 3 \quad 3 \)

Withdrawal after touch (no. calves)\( ^c \)

\( 13 \quad 6 \quad 9 \quad 5 \quad 5 \)

Duration of withdrawal (s)

\( 2.2 \quad 1.3 \quad 1.5 \quad 0.7 \quad 0.3 \)

\( \text{a} \) Individual housing \( (n=16 \text{ calves}) \), group housing \( (n=\text{eight pairs}) \).

\( \text{b} \) MC: minimal contact; AC: additional contact.

\( \text{c} \) Fisher-exact test on qualitative data not averaged in pens.
A tendency \( (F_{7,40} = 3.58, p \approx 0.07) \) for an interaction effect was found for effort to unload, indicating that for pair housed calves without human contact more effort was needed to unload them from the truck to the calves’ room, than for any other calves. No significant differences were found in the frequency of buck kicking and time spent running during (un)loading.

No treatment differences were found in the heart rate of the calves during the 10 min preceding loading and during the 5 min after loading (Fig. 1). During loading, calves that had received additional contact had a significantly lower heart rate at loading \( (F_{7,40} = 6.74, p < 0.01) \) compared to calves that had received minimal contact. A significant interaction between housing condition and contact was also found \( (F_{7,40} = 4.17, p < 0.05) \) during loading, indicating that individual housed calves with additional contact had a lower heart rate. Furthermore, calves with additional contact tended to have a lower heart rate at unloading \( (F_{7,40} = 2.95, p < 0.09) \) compared to calves that had received minimal contact. During the 30 min transport, calves that were housed in pairs had a significantly lower mean heart rate compared to calves that were housed individually \( (F_{7,40} = 6.14, p < 0.02) \). No interaction between housing condition and contact was found.

The blood cortisol level increased significantly after transport \( (\Delta \text{ (immediately after transport—before loading)} = 14.2 \pm 2.0, t = 7.2, p < 0.01) \) and returned to baseline within 2 h after transport \( (\Delta \text{ (2 h after unloading—before loading)} = -1.3 \pm 0.8, t = 1.5, p > 0.05) \) (Fig. 2). No treatment effects or interactions were found in cortisol response to loading and transport.

### Table 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Individual housing</th>
<th>Group housing</th>
<th>S.E.M.</th>
<th>Main effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Housing</td>
<td>Contact</td>
<td>Housing</td>
<td>Contact</td>
</tr>
<tr>
<td>Loading onto the truck</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to load (s)</td>
<td>39.3</td>
<td>40.8</td>
<td>55.5</td>
<td>57.3</td>
</tr>
<tr>
<td>Buck kicking (freq.)</td>
<td>1.3</td>
<td>1.6</td>
<td>1.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Time spent running (s)</td>
<td>4.1</td>
<td>3.4</td>
<td>2.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Pushes needed (freq.)</td>
<td>3.6</td>
<td>2.6</td>
<td>7.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Effort to loada</td>
<td>9.4</td>
<td>5.6</td>
<td>13.4</td>
<td>8.1</td>
</tr>
<tr>
<td>Unloading from truck to pen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to unload (s)</td>
<td>41.6</td>
<td>33.7</td>
<td>58.9</td>
<td>52.2</td>
</tr>
<tr>
<td>Buck kicking (freq.)</td>
<td>1.4</td>
<td>1.6</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Time spent running (s)</td>
<td>3.3</td>
<td>4.6</td>
<td>3.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Pushes needed (freq.)</td>
<td>2.3</td>
<td>2.2</td>
<td>6.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Effort to unloadb</td>
<td>5.8</td>
<td>6.4</td>
<td>10.6</td>
<td>5.4</td>
</tr>
</tbody>
</table>

- Individual housing \((n=16 \text{ calves})\), group housing \((n=8 \text{ pairs})\).
- MC: minimal contact; AC: additional contact.
- Effort to load = \((\text{frequency of pushes during loading})/(\text{loading time})\); effort to unload = \((\text{frequency of pushes during unloading})/(\text{unloading time})\).
4. Discussion

This study clearly demonstrated that housing and additional contact with calves can modify the calves’ later responses to people, handling and transport.
Providing additional positive contact for calves by stroking their necks and shoulders, and occasional sucking of the fingers, increased the calves’ motivation to interact with people compared to calves that had received minimal contact. Other studies have also reported increased interaction with an unfamiliar person when animals received extra positive handling (e.g. poultry: Jones and Waddington, 1992; pigs: Hemsworth et al., 1986; Tanida et al., 1995; calves: Lensink et al., 2000a). Similarly, when the calves were touched after being approached in front of their pen, calves having received additional contact from the stockperson withdrew less often than calves having received minimal contact. Although the two tests were quite different in terms of timing (entering the pen after the meal or approaching the pen during meal), gender of the test person (female or male), colour of their overall (brown or red) and the way the person appeared (motionless or moving), the calves’ reactions were similar. Hence it seems that in general, additional positive contact increases the calves’ motivation to interact with and/or decreases their fear of people.

Improved responses to people were also observed in the transport test. During loading onto the truck, the additional contact calves had a lower heart rate than calves with minimal human contact. Similar results were found in horses, where animals that were handled intensively had a lower heart rate during handling than previously non-handled ones (Jezierski et al., 1999) and in sheep where talking to and patting the sheep reduced the heart rate response to human presence (Hargreaves and Hutson, 1990). The lower heart rate during loading could reflect decreased physical effort connected with movement. However, the level of locomotion (frequency of buck kicking or time spent running) during loading and time needed to load the animals did not differ between calves having received additional contact and calves without contact. It is more likely that the emotional reaction to the presence of and contact with people accounts for the difference in the heart rate during loading. Rushen et al. (1999) showed that dairy cows that were mistreated previously by a person had consequently a higher heart rate when this person was present during milking. In our study, it also took less effort to load calves having received additional contact towards the truck compared to the minimal contact ones. These results confirm earlier findings in cattle, that extra handling, like brushing or getting them accustomed to being led by a rope, reduces difficulties in handling for routine management practices (Boissy and Bouissou, 1988; Boivin et al., 1992a,b).

It was hypothesised that pair housed calves would be less motivated to interact with people, would be more fearful of them and would be more difficult to handle than individually housed calves. When a person approached their home pen and touched the calves during meal time, calves housed in pairs did not show more avoidance of that person. However, when an unfamiliar person entered their pen, the pair housed calves were slower to interact, interacted less frequently and tended to spend less time interacting with the person in the pen. The latter results seem therefore to support the hypothesis that the interactions of the pair housed calves with the stockpersons might have been less efficient compared to individually reared ones (Veissier et al., 1998). An alternative explanation could be that the pair housed calves reacted initially to the temporary isolation during the test. In order to observe the calves’ individual responses to a person, a plywood plate was placed in the pen, which separated the paired calves. Social isolation can reduce exploration of objects or humans (Boissy and Le Neindre, 1990).
When loaded individually on a truck, it took more time and effort to load and unload pair housed calves compared to the individually housed ones. This confirms earlier findings that group housed calves, either reared in groups of five or 15 calves, are more difficult to load than individually reared ones (Trunkfield, 1990; Albright et al., 1991). Albright et al. (1991) indicated that in their study, the group housed calves exhibited more interest and directed their attention to more sniffing and investigation of the alley floor when loaded onto a truck, and Trunkfield (1990) reported more balking and turning, compared to individually housed ones. In our experiment, a similar behaviour was observed as the group housed calves stopped more often during loading as indicated by the number of pushes performed by the two truck drivers. In addition, the reaction to this handling procedure can be confounded with the fact that our animals were loaded individually towards the truck. The paired calves were socially isolated, and might therefore have shown an increased reaction to the handling procedure. However, pair housed calves were not more stressed as observed using the physiological measures of heart rate and cortisol levels, which did not differ significantly between pair housed and individually housed calves.

During transport, individually housed calves had a significantly higher heart rate compared to the pair housed ones. Different reasons can be given for this, for example, being together with other calves might have led to elevated heart rates for calves that were previously housed individually. Individually housed calves have been reported to lack social experience (Broom and Leaver, 1978), and grouping these calves could cause restlessness or even excitement and an increase in activity (Kenny and Tarrant, 1987), therefore accounting for the elevation in heart rate. As for each batch the four calves of a same treatment were transported together, this implicates that the pair housed calves were always with their pen mate. Therefore, the mixing for the pair housed calves included a lower degree of novelty compared to the individually housed ones. Also the presence of a pen mate can have a calming effect on the animal’s response to a stimulus, as shown by Boissy and Le Neindre (1990) who observed that the presence of peer animals reduced heifers’ responses to fear-eliciting stimulations.

At first, we hypothesised that human contacts would be less efficient for pair housed calves than for individually housed calves. In our study, there was no evidence for such an interaction between contact and housing, except for the tendency of pair housed minimal contact calves to be more difficult to be unloaded than all other calves. In all other tests, either one of the two factors had an effect on the calves’ responses (for example, latency to interact with the person in the pen, reduced by individual housing), or additive effects were found (for example, total time interacting with the person in the pen increased by both additional contact and individual housing). So it seems that whatever the housing condition, human contacts have the same effect. However, it can be argued that the lack of interaction between housing condition and contact could be due to the size of the group. In our study, we housed calves in pairs, and it can be imagined that increasing the group size would reduce the impact of the stockperson’s contacts on the individual animals. Furthermore, the calves housed individually in our experiment were only physically but not visually isolated from conspecifics. Isolation of calves has been reported to induce a better coping of the animals to human handling through processes similar to ‘imprinting’ (Purcell and Arave, 1991), therefore improving the human–animal relationship. The individual housing applied in our study might not have been different enough from the calves housed
in pairs to induce a significant effect of the stockperson on the calves’ behavioural response to people.

In conclusion, our results demonstrate that the calves’ reaction to people, handling and transport is influenced by the way they are housed. Group housed calves seem to be less eager to interact and generally less easy to be handled compared to individually housed calves. Providing regular additional contact in the form of stroking the necks and shoulders of the calves and occasional sucking of the stockperson’s fingers can increase the calves’ motivation to interact with people, reduce the level of withdrawal, and increase the ease of handling regardless of the housing condition. Furthermore, calves that are easier to move are less likely to be subject to rough handling at, for example a slaughterhouse, which implies improved welfare. Hence it seems to be essential that group housed animals receive positive contacts during rearing in order to overcome fear of people, increase ease of handling and decrease the stockperson’s workload and risk of injury.

Acknowledgements

This work has been financed by the European Commission, Directorate General for Agriculture, within the framework of the RTD contract FAIR 2049: ‘Chain Management of Veal Calf Welfare’. The content of this publication is the sole responsibility of its publishers. It in no way represents the views of the Commission or its services. We thank the staff of Lintupaju farm for the caretaking of the calves, K. Kaustel for her participation in the tests, and A. Vartiainen for the blood sampling. We also thank S. Andanson and H. Cassagne for the cortisol analyses, C. Durier for her advice on statistics, and M. Cockram and T. Ngapo for revising the English manuscript.

References


