Effect of Pair Housing Versus Individual and Group Housing on Behavioural Patterns of Buffalo Calves

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ABSTRACT

This study aimed to evaluate the effect of pair housing versus individual and group housing on behavioural patterns of female buffalo calves (n = 18; 15.0±3.0 days of age) were assigned randomly to 1 of 3 treatments of group housing with (C1=one calf/pen, C2=two calves/pen, or C3= three calves/pen) supplying a total pen space allowance of 1.82 m²/calf, regardless of pen size. Behaviour was recorded by direct observation throughout the day from 10:00 to 14:00 clock, during a single day each week for 12 weeks using scan sampling every 15 min within 4 hours’ observation sessions. Calves housed in C2 group showed more (P ≤ 0.05) eating and drinking, chewing/ruminating, object manipulation and self grooming, lying activities, and less (P < 0.05) inactivity and standing when compared to calves housed in C1 and C3 groups. In conclusion, raising buffalo calves in paired housing system provided calves more opportunity to express their comfort, grooming, and feeding activities compared to individual and group housing system, however further investigation is still required to study the effect of paired housing system on the performance and physiological indicators in buffalo calves.
when they were fed individually. On contrary, several researchers recorded that calves housed in groups may suffer from cross-sucking behaviour, chronic social stress, and high risk of infection (Veissier et al., 1998; Jensen and Budde, 2006; Svensson and Liberg, 2006).

Recently, researchers reported several advantages for pair housing in cattle. Chua et al. (2002) and Bolt et al. (2017) stated that housing dairy calves in pairs allows benefits such as increased space for movement and social opportunities with no disadvantages in health and weight gains. De Paula Vieira et al. (2010) stated that pair housing during the milk-feeding stage reduces calf responses to weaning and improves performance after weaning when calves are housed in groups.

Information regarding pair housing effect on buffalo calves well-being is scarce; therefore, the objective of the present study was to compare the effect of pair housing versus individual and group housing on behavioural patterns of buffalo calves.

Materials and methods

The study was conducted at a local farm in Arab Mtir village, Abnob, Assiut, Egypt, which provided facilities, calves and feed. The study was carried out over 3 months, from February to May, 2016. All experimental procedures were in compliance with the guide for the care and use of Agricultural Animals in Research and Teaching (2010), and approved by Faculty of Veterinary Medicine, Assiut University, Egypt.

Experimental design and Animals Housing

Buffalo female calves (n = 18) (15.0±3.0 days of age) were allotted randomly into 9 pens. Experimental pens (1.5 m length × 1.2 m width × 1.21 m height) consisted of stainless steel partitions that enabled visual and tactile contact between calves. After 1 week of acclimation, calves were assigned randomly to 1 of 3 group-housing treatments (1, 2, or 3 calves/pen). Those assigned to 1 calf/pen remained as they were, whereas those assigned to 2 or 3 calves/pen had the metal partitions between neighboring pens removed to form the larger groups. Three replicated pens of each treatment were formed. The total pen area allowance was kept constant at 1.82 m²/calf for all group sizes (Abdelfattah et al., 2013).

All the calves took milk by nipple feeding twice a day up to three months of age as routine practices. Green fodder and fresh water were also provided round the clock. Commercial calf starter ration (18% Crude protein) ration were offered in the morning.

Behavioural measurements

Behaviour was recorded by direct observation throughout the day from 10:00 to 14:00 clock, during a single day each week for 12 weeks using scan sampling (Martin and Bateson, 1993), every 15 minutes within 4 hours’ observation sessions. The calves’ behaviours were observed according to a pre-defined ethogram (Table 1). Individual behavioural measurements were taken every 15 minutes by using the scan sampling recording method. Data was presented as the percentage frequency of each behavioural pattern within category (Andrighetto et al., 1999).

Statistical analysis

For the analysis, pen was considered the experimental unit. The data were analyzed by means of SPSS 16.00 Software. The Shapiro-Wilk test was used to analyze the normality of the data; all the data were normally distributed. The effect of housing on buffalo calves’ behaviour was analyzed by one-way ANOVA procedure.

Results

Results represented in Fig. 1, clarified that eating and drinking activities and chewing/ruminating activities in C2 group were significantly (P< 0.05) higher than those recorded in C1 and C3 groups, respectively.

Table 1. Ethogram for instantaneous scan sampling of buffalo calves (certain behaviors were combined into a single category)

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Description</th>
<th>Category</th>
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<tbody>
<tr>
<td>Standing</td>
<td>Standing with all four feet on the ground either active or inactive</td>
<td>Posture</td>
</tr>
<tr>
<td>Lying</td>
<td>Lying on sternum with head held in a raised position or down</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>Stepping and moving</td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td>Head in trough accompanied by chewing movements</td>
<td></td>
</tr>
<tr>
<td>Drinking</td>
<td>Mouth around drinker</td>
<td></td>
</tr>
<tr>
<td>Manipulating object</td>
<td>Biting, sniffing, sucking or licking pen fixtures or fitting</td>
<td></td>
</tr>
<tr>
<td>Chewing/ruminating</td>
<td>Irregular, repetitive chewing without discernable food in the mouth</td>
<td>Maintenance</td>
</tr>
<tr>
<td>Self-licking</td>
<td>Movements with tongue over own body surface</td>
<td></td>
</tr>
<tr>
<td>Scratching</td>
<td>Scratching themselves using leg</td>
<td></td>
</tr>
<tr>
<td>Rubbing</td>
<td>Moving body against walls, partitions or other calf</td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>Carrying out no discernable behavior</td>
<td></td>
</tr>
</tbody>
</table>
Results represented in Fig. 2, clarified that object manipulation and self-grooming activities in C2 group were significantly (P < 0.05) higher than those recorded in C1 and C3 groups, respectively. While, the inactivity behavioural patterns incidence in C2 group was significantly (P < 0.05) lower than those recorded in C1 and C3 groups, respectively.

Fig. 2. Effect of pair housing versus individual and group housing on object manipulation, inactivity and self-grooming activities percentage in buffalo calves.

Results represented in Fig. 3, clarified that standing activities in C2 group were significantly (P < 0.05) lower than those recorded in C1 and C3 groups, respectively. While it reflected that the lying behavioural patterns in C2 group were significantly (P < 0.05) higher than those recorded in C1 and C3 groups, respectively. However, it had shown no significant (P > 0.05) differences in walking activities between C1, C2, and C3 groups.

Fig. 3. Effect of pair housing versus individual and group housing on movement and resting activities percentage in buffalo calves.

Discussion

According to our knowledge, this is the first study investigated the effect of pair housing versus individual and group housing on behavioural patterns of buffalo calves. Previous studies have tested the effect of regrouping, group size in different spaces, housing veal calves in large groups, while maintaining calf floor space allowance or individual versus group rearing in dairy cattle and veal calves (Rushen and de Passillé, 1992; Abdelfattah et al., 2013). No previous work was done on buffalo calves.

Results represented in Fig. 1, clarified that eating and drinking activities and chewing/ruminating activities in C2 group were significantly higher than those recorded in C1 and C3 groups, respectively. Supporting the present study, De Paula Vieira et al. (2010) found that paired calves had a shorter latency to start feeding, visited the starter feeder more frequently, spent more time at the feeder, and consumed more starter than individually housed calves. Also, Duve et al. (2012) recorded that calves receiving the high milk allowance and housed in pairs spent more time feeding than did those receiving the high milk allowance and housed singly. Regarding the group housing, similarly, Abdelfattah et al. (2013) reported that calves in pens of 2 were observed eating, drinking, chewing and ruminating more than calves in groups of 4 or 8. Abdelfattah et al. (2013) attributed the fewer percentages of calves eating and drinking throughout the day in the groups contain from 4 or 8 calves to the increased social interaction among calves in these groups, which may be resulted in increased the speed of diet consumption, thereby reducing eating and drinking behaviour in comparison to calves in groups of 2.

Results represented in Fig. 2, clarified that object manipulation and self-grooming activities in C2 group were significantly higher than those recorded in C1 and C3 groups, respectively. Similarly; Abdelfattah et al. (2013) reported that calves housed in pairs had higher object manipulation and self-grooming activities than calves in groups contain 4 or 8 calves. They suggested that the increase in object manipulation and self-grooming activities in calves housed in pairs may be attributed to the social deprivation, which may be enhanced the non-nutritive oral activities in dairy calves (Veissier et al., 1997; Chua et al., 2002). While, regarding the significant reduction in object manipulation and self-grooming activities in calves housed individually in compare to calves housed in pairs this articles could not figure out the reason or give any suggestion. On contrary, Chua et al. (2002) reported no differences in the amount of time spent self-grooming between individually and pair-housed calves.

Results represented in Fig. 2, the inactivity behavioural patterns incidence in C2 group was significantly lower than those recorded in C1 and C3 groups, respectively. Authors attributed the increased of inactivity in group housed calves to be as a result of displaced calves waiting for access to the feed. The current article could suggest that the calves in pairs were less inactive than calves housed individually or in groups due to the increase in their feeding, object manipulation and self-grooming activities.

Regarding standing activities, results represented in Fig. 3, clarified that standing activities in C2 group were significantly lower than those recorded in C1 and C3 groups, respectively. Similarly, Abdelfattah et al. (2013) reported that calves housed in groups contain 4 and 8 calves stood more when compared with pairs housed calves, and attributed this to the availability of free space in these groups which gives an opportunity for calves to stand and walk more. As it is already established that calves moved more easily when they were housed together in a pen than when they were housed in individual stalls because other calves leaving space for others to remain standing (Veissier et al., 1997). Similarly, Babu et al. (2004) stated that the time spent for idle standing activities in individual housing were more than group housing. On contrary, Chua et al. (2002) and De Paula Vieira et al. (2012) mentioned that pair-housed calves spent more time standing than individually housed animals.

Current results represented in Fig. 3, reflected that the lying behavioural patterns in C2 group were significantly higher than those recorded in C1 and C3 groups, respectively. In agreement with these finding Abdelfattah et al. (2013) reported that calves housed in pairs observed lying more than...
groups contain 8 and 4 calves; they attributed the reduced lying behaviour in groups of 8 and 4 to the greater social interaction between calves and disturbance from pen-mates, which prevent lying in those groups. While, Chua et al. (2002) recorded no differences in the lying down between calves housed individually or in pairs. Moreover, Babu et al. (2004) stated that the time spent for sleeping/lying activities in individual housing were more than in group housing.

The current study results represented in Fig. 3, have shown no significant differences in walking activities between C1, C2, and C3 groups. Similarly, Telezhenko et al. (2012) stated that group size had no effect on movement of cows. On contrary, Abdelfattah et al. (2013) reported that calves housed in groups of 8 and 4 walked more than calves housed in small groups of 2, suggesting that increased group size was accompanied with increased locomotion.

Conclusion

The results of these experiments provide the first direct evidence that pair housing improve the behavioural pattern expression in buffalo calves. Current study results reflected that housing buffalo calves in pairs allows benefits such as increased opportunities for social interaction and movement with no disadvantages on health. In conclusion, paired housing system provided calves more opportunity to express their comfort, grooming, and feeding activities compared to individual and group housing system.

References


Desta TT., 2012. Introduction of domestic buffalo (Bubalus bubalis) into Ethiopia would be feasible. Renewable Agriculture and Food Systems 27, 305–313.


