

BEHAVIOURAL ACTIVITIES CHANGES AFTER TRANSITION FROM TIED TO LOOSE HOUSING IN EGYPTIAN BUFFALOES

Elsayed E. Eldahshan; Samier H. El-Kaschab; Elham M. Ghoneim
and Magdy G. Elshahawy

Department of Animal Production, Faculty of Agriculture, Menoufia University.

Received: May 18, 2024

Accepted: Jun. 1, 2024

ABSTRACT: Sixteen Egyptian buffaloes, 8 lactating buffalo cows and 8 heifers, were located at the animal behaviour research unit, belonging to the faculty of agriculture, Menoufia University, Shebin El-kom, Egypt, randomly chosen to study the behavioural reaction of the Egyptian lactating buffalo and heifers to release from the restriction. Animals were kept in closed housing system in tie-stall barn with hard surface permanently; they were released from restraints at 10 am for 5 hours/a day for 7 days. Released animals were monitored by video recording system for 5 hours/a day for 7 days, with a total observation time of 560 hour, using complete digital behavioural observation unit. The studied behaviours differed between lactating buffaloes and heifers. The heifers tend to lie down (0.40 time/ h. and 3.56 min. / h.) and eat more (3.00 time/ h. and 16.20 min. / h.) than lactating buffaloes (lie down 0.10time/ h. and 0.87 min. and eat 1.26 time/ h. and 7.57 min. / h.) during the first five hours after tie releasing; Also, in terms of social behaviour, the heifers recorded higher numbers for playing behaviour (3.76 time/h. and 3.78 min. /h.) compared to the lactating buffaloes (1.83 time/h. and 0.38 min. /h.), but the lactating buffaloes was higher in agonistic and affiliative behaviours than the heifers, but not significantly. During the first hours after being untethered, the animals (the lactating buffaloes and the heifer) were preoccupied with social behaviour (playing, agonistic and affiliative) rather than daily activities such as eating, ruminating and lying down. However, this trend decreases over time and moves towards stability and they tended to practice all their behaviours in a natural balance.

Key words: Buffalo, housing system, Released animals, social behaviour.

INTRODUCTION

Some practices associated with more intensive farming systems can interfere with the natural social behaviour of individual domestic cattle (Nogues *et al.*, 2023). Tie-stall housing, in which animals are typically chained to the head rail at the front of the stall, comprise almost Egyptian buffalo farms. This type of housing permits individualized care and rationing and reduces the risk of agonistic behaviour (Beaver *et al.*, 2019). However, the lying surface remains wet and dirty with the animal urine and feces, thereby increasing the risk of udder health problems. Under these housing conditions buffaloes are unable to express their natural behaviour and reach their full productive potential (Magsi *et al.*, 2018). Some research has demonstrated that physiologic parameters are unchanged in cows housed in tie-stalls versus

free-stalls (Giulioti *et al.*, 2017). The thwarting of natural behaviour can lead to negative experience while failing to impact biological functioning (Fraser *et al.*, 1997). Free stall housing is a good alternative that provides a dry, clean, and comfortable resting surface for animals (von Keyserlingk *et al.*, 2011). There is ample evidence in support of behavioural benefits in less restrictive housing types (eg, Higashiyama *et al.*, 2007 and Haley *et al.*, 2001). In one study, cows transferred from pasture to tie-stall housing exhibited irregular patterns of lying behaviour and a temporary deterioration of locomotor ability, which was still apparent 4 days after their return to pasture (Enriquez-Hidalgo *et al.*, 2018). Moreover; when permitted access to outdoor spaces, cows typically housed in tie-stalls devote large portions of their time budget to romping and exploring the

environment (Loberg *et al.*, 2004 and Krohn *et al.*, 1992). Temporary release into outdoor spaces and regular exercise opportunities are beneficial from the perspective of both behaviour and health (Enriquez-Hidalgo *et al.*, 2018, Regula *et al.*, 2004 and Popescu *et al.*, 2013).

Von Keyserlingk *et al.* (2009) reported that concerns about the welfare of animals typically include 3 questions: is the animal functioning well (e.g., good health, productivity, etc.), is the animal feeling well (e.g., absence of pain, etc.), and is the animal able to live according to its nature (e.g., perform natural behaviours that are thought to be important to it, such as grazing)? Welfare principally concerns both the physical and psychological wellbeing of an animal (FAWC, 2009). Therefore restraining an animal represents a negative condition for the animal's welfare.

Housing animals in groups can have positive effects on the welfare of individual cattle; for example, by facilitating natural behaviours such as social grooming, and by preventing negative effects associated with social deprivation (Magsi *et al.*, 2018 and Costa *et al.*, 2016). Limited data are available about buffalo behaviour in free stall housing (Magsi *et al.*, 2018). Thus, it is clear the importance of releasing the Egyptian buffalo from restraints and providing better housing conditions to provide a high degree of welfare for the strategic milk and meat animal in Egypt, which is the buffalo. Therefore, the aim of this study was to declare the behavioural reaction of the Egyptian lactating buffalo and heifers to release from the restriction.

MATERIAL AND METHODS

Animals and Management

Sixteen animals (8 buffalo cows and 8 heifers) were housed in the animal behaviour research unit, belonging to the faculty of agriculture, Menoufia University, Shebin El-Kom, Egypt, randomly chosen for this experiment. The animals were divided into two groups; the first one was Eight Egyptian buffalo heifers aged about 12-14 month and averaged 287 ± 22 kg of body weight (BW). The second

group was eight multiparous Egyptian buffalo cows (second to fourth parity) averaging 610 ± 50 kg of BW, 120 ± 30 days in milk and producing 8.09 ± 1.12 kg of milk/d.

The animals were fed an Egyptian clover (*Trifolium alexandrinum*), rice straw and concentrate mixture. The Concentrate mixture was restricted offered twice daily at 6 am and 6 pm according to their requirements; on the other hand the roughage was presented ad-lib. Water was available ad-lib from automatic drinkers. Lactating buffaloes were milked twice daily (at 6 am and 6 pm) in the stall using portable milking machine.

Animals were kept in closed housing system in tie-stall barn with hard surface permanently; they were released from restraints at 10 am for 5 hours/a day for 7 days.

Ethical approval

All experimental procedures were approved by the scientific research ethics and animal use committee (SRE & AUC) – Faculty of Agriculture – Menoufia University, Egypt. Approval №: **015-SRE & AUC-MUAGR-06-2024**.

Studied Criteria

Released animals were monitored by video recording system for 5 hours/a day for 7 days, with a total observation time of 560 hour, using complete digital behavioural observation unit, which consists of 8 digital observation camera, digital storage unit and control unit. Continuous observation methods were used to record the following studied behavioural patterns of each animal during observation periods:

- A. Frequency and total period of lying behaviour: Lie was defined as all legs relaxed with underside in contact with the floor (Weimer 2012).
- B. Frequency and total period of eating behaviour: defined as feeding in mouth, chewing, or head down in the manger close to the feed (Alzahal *et al.*, 2006).

- C. Frequency and total period of ruminating behaviour: defined as the time when the animals were not eating and were re-chewing the bolus (Mezzalira *et al.*, 2012).
- D. Frequency and duration of play behaviour (object play, locomotors play and social play). (Waiblinger *et al.*, 2020).
- E. Frequency and duration of agonistic social interactions: Agonistic behaviour Socio-negative interaction, Agonistic behaviours are often associated with competition, including attack, escape, threats, head butts, avoiding, submission, and defense behaviours. (Krohn, 1994. Huzzey *et al.*, 2006; Lobeck-Luchterh and *et al.*, 2014, Winckler *et al.*, 2015 and Val-Laillet *et al.*, 2008 and Waiblinger *et al.* 2020).
- F. Frequency and duration of affiliative social interactions; Affiliative behaviour Socio-positive interaction including allogrooming, rubbing, and social play, social licking and licking solicitation (Krohn, 1994 and Waiblinger *et al.*, 2020).

Statistical analysis

The data were analyzed using the general linear model of IBM SPSS Statistics 22 statistical package (SPSS Inc., Chicago, IL, US) according to the following model:

$$Y_{ijk} = \mu + S_i + T_j + ST_{ijk} + e_{ijk}$$

Where:

- Y_{ijk} Criteria studied for buffaloes in the ijk subclass;
- μ Overall mean;
- S_i The effect due to the i_{th} animals status, $i = 1, 2$, where:
1=lactating buffalo, 2= buffalo heifers;
- T_j The effect due to the j_{th} hours after animals releasing, $j = 1, 2, 3, 4, 5$, where:
1= the first, 2= the second, 3= the third, 4= the fourth and 5= the fifth hour after releasing animals from tie;
- ST_{ijk} The interaction effect of i_{th} animals status and j_{th} hours after animals releasing
- e_{ijk} Random error.

Means between different groups were tested by Duncan test.

RESULTS AND DISCUSSION

Table 1 shows lying behaviour/hour of lactating buffaloes and heifers in the first five hours (300 min.) after tie releasing. It is clear from this table that the frequencies and periods of heifers lying behaviour (0.40 time /h. and 3.56 min. /h.) are significantly ($P < 0.05$) increased than those of lactating buffaloes (0.10 time /h. and 0.87 min. /h.).

With regard to lying behaviour during each hour separately after tie releasing; the lactating animals were only lied down during the third (0.33 time /h. and 1.50 min. /h.) and fourth hours (0.16 time /h. and 2.83 min. /h.) after the restraint was removed. But she did not lie down during the rest studied hours. However, the heifers were lying more frequently and longer at the fifth hour (1.60 time /h. and 14.60 min. /h.) than at the fourth hour (0.40 time /h. and 3.20 min. /h.). As for the remaining hours, the heifers did not lie down at all. The time after tie releasing had a significant ($P < 0.05$) effect on the frequency and a highly significant ($P < 0.01$) effect on the periods of lying behaviour. The absence of lying behaviour during the first two hours after releasing may be due to its social interaction. This agreement with Hernandez-Mendo *et al.* (2007) who showed that cows actually spent less time lying down when access to suitable standing surfaces.

Even though, decreased lying can reduce food intake and yield, as well Munksgaard *et al.* (2012); Lying behaviour has been identified as an element which can be used to measure a cow's welfare status and is also often referred to when assessing cow comfort (O'Driscoll *et al.*, 2009; Tolkamp *et al.*, 2010). The absence of lying behaviour during some hours of this study does not mean poor animal welfare, but rather expresses its preoccupation with other behaviours, such as social behaviour. The Animal's status had a highly significant interaction effect with the time after tie releasing for the frequencies and periods of lying. This means that the differences in lying behaviour in lactating buffaloes during the first five hours of the animals' releasing do not take the same trend in the heifers.

Table 1: Lying behaviour of lactating buffaloes and heifers during the first five hours of being released.

Animal's status	Lying freq.	Lying period	hours	Lying freq. (time)	Lying period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	0.10 ± 0.01 (time/h.)	0.87±0.11 (min. /h.)	1 st	0.00±0.00 ^b	0.00 ^b ±0.00
			2 nd	0.00 ^b ±0.00	0.00 ^b ±0.00
			3 rd	0.33 ^a ±0.13	1.50 ^a ±0.61
			4 th	0.16 ^a ±0.06	1.15±2.83 ^a
			5 th	0.00 ^b ±0.00	0.00 ^b ±0.00
buffalo heifers	0.40±0.03 (time/h.)	3.56±0.29 (min. /h.)	1 st	0.00 ^c ±0.00	0.00 ^c ±0.00
			2 nd	0.00 ^c ±0.00	0.00 ^c ±0.00
			3 rd	0.00 ^c ±0.00	0.00 ^c ±0.00
			4 th	0.40 ^b ±0.10	3.20 ^b ±1.04
			5 th	1.60 ^a ±0.30	14.60 ^a ± 2.02
Sig.	0.05	0.05	Sig.	0.05	0.01

** Different letters within each column mean significant differences between values.

Eating behaviour, frequencies and periods, were determined of lactating buffaloes and heifers in the first five hours (300 min.) after tie releasing (free), in this respect Table 2 shown that, the differences were highly significant ($P < 0.01$) for Eating behaviour, frequencies and periods, between lactating buffaloes and the studied heifers. The heifers recorded more frequencies (3.00 time/h.) and longer eating periods (16.20 min./h.) during the first five hours after tie releasing than lactating buffaloes (1.26 time/h. and 7.57 min./h., respectively).

With regard to eating behaviour during each hour separately after tie releasing; there were no significant differences in either eating frequency or eating period of lactating buffaloes during the five hours. However, eating frequency of heifers was the lowest in the first hour (1.00), which differed significantly with the frequency at

subsequent, 2nd, 3rd, 4th and 5th, hours (3.60, 3.40, 3.40, 3.60 times resp.). also, eating period differed significantly within the five hours where the first hour was the shortest period (1.00 min.), then increased to the longest period in the second hour (30.80 min.), there after began to decrease significantly from the third hour (7.40 min.), and the significant increase resumed from the fourth to the fifth hour (15.40, 26.40 min., respectively). The time after tie releasing had a significant ($P < 0.05$) effect on the frequency and a highly significant ($P < 0.01$) effect on the periods of eating behaviour. The best recognized effect of heat stress and acute transition diseases are reducing appetite (Silanikove, 2000 and González *et al.*, 2008). The Animal's status had a highly significant interaction effect with the time after tie releasing for the periods of eating.

Table 2 : Eating behaviour of lactating buffaloes and heifers during the first five hours of being released

Animal's status	Eating freq.	Eating period	hours	Eating freq. (time)	Eating period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	1.26±0.04 (time/ h.)	7.57±0.34 (min. /h.)	1 st	1.00±0.19	6.33±2.40
			2 nd	1.50±0.31	7.67±1.54
			3 rd	1.33±0.25	7.83±2.27
			4 th	0.83±0.19	6.67±1.20
			5 th	1.67±0.13	9.33±1.18
buffalo heifers	3.00±0.05 (time/ h.)	16.20±0.50 (min. /h.)	1 st	1.00 ^b ±0.00	01.00 ^c ±0.00
			2 nd	3.60 ^a ±0.33	30.80 ^a ±0.89
			3 rd	3.40 ^a ±0.22	07.40 ^c ±0.30
			4 th	3.40 ^a ±0.10	15.40 ^b ±0.94
			5 th	3.60 ^a ±0.22	26.40 ^a ±2.14
Sig.	0.01	0.01	Sig.	0.05	0.01

** Different letters within each column mean significant differences between values.

Ruminating behaviour of lactating buffaloes and heifers after tie releasing was listed in Table 3. The frequencies and periods of lactating buffaloes ruminating behaviour (1.63 time /h. and 17.40 min. /h.) were significantly increased ($P < 0.01$) than those of heifers (0.04 time /h. and 0.48 min. /h.).

Ruminating frequency wasn't significantly changed during each hour separately after lactating buffaloes tie releasing; the third hour was the highest (2.50 times), while the first hour was the least (1.00). On the other hand, the animals were ruminated 2.16 min. at the first hour which represented the least period and ruminated (17.00, 21.83, 23.83 and 22.16 min.) at second, third, fourth and fifth hours resp. The differences were significant ($P < 0.05$) between the first hour and the rest of four hours. It should be noticed that ruminating behaviour always harmonizes and matches with eating and idling behaviour. The heifers Ruminating frequency was nearly equal over the hours. Ruminating period also was almost equal in the free animals so it was in the first, second, third, fourth and

fifth hours (0.00, 0.00, 0.00, 1.41 and 1.00 min. resp. ($P > 0.05$)). After releasing animals, didn't ruminate for the first three hours because they are preoccupied with playing behaviour and social interaction. The time after tie releasing had a significant ($P < 0.05$) effect on the ruminating period and a non-significant ($P > 0.05$) effect on the frequencies of ruminating behaviour.

Bolinger *et al.* (1997) reported that total rumination frequency over 24h was not significantly different between restrained and unrestrained cows. Herskin *et al.* (2004) noted that decreased rumination for all stressors. As is clear from the Tables 1, 2 and 3, it is clear that there is no behaviour of lying down, eating, and ruminating during the first hours after the animal is released from the restrains. This does not reflect the animal's poor welfare, but is a result of its preoccupation with social behaviour. The Animal's status had a highly significant interaction effect with the time after tie releasing for the periods of ruminating.

Table 3 : Ruminating behaviour of lactating buffaloes and heifers during the first five hours of being released

Animal's status	Ruminating freq.	Ruminating period	Hours	Ruminating freq. (time)	Ruminating period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	1.63±0.03 (time/ h.)	17.40±0.45 (min. /h.)	1 st	1.00±0.25	2.16 ^b ±0.49
			2 nd	1.33±0.13	17.00 ^a ±2.50
			3 rd	2.50±0.13	21.83 ^a ±1.63
			4 th	1.66±0.08	23.83 ^a ±2.52
			5 th	1.66±0.20	22.16 ^a ±2.03
buffalo heifers	0.04±0.01 (time/ h.)	00.48±0.10 (min. /h.)	1 st	0.00±0.00	0.00±0.00
			2 nd	0.00±0.00	0.00±0.00
			3 rd	0.00±0.00	0.00±0.00
			4 th	0.10±0.08	1.40±1.07
			5 th	0.10±0.80	1.00±0.44
Sig.	0.01	0.01	Sig.	NS	0.05

** Different letters within each column mean significant differences between values.

Table 4 shows playing behaviour of lactating buffaloes and heifers after tie releasing, it is clearly appear that the rate of playing in heifers were increased and continued for more hours compared to lactating buffaloes. Playing frequency was significantly higher in heifers ($P<0.01$) than those of lactating buffaloes (3.76 and 1.83 times /h., respectively). Also playing period in heifers was significantly higher ($P<0.01$) than those of lactating buffaloes (3.78 and 0.38 min. /h., respectively). This result was in agreement with Stenfelt *et al.* (2022), who noted that in dairy cattle, the presence of an older and more experienced social partner reduces responses to fear-eliciting stimuli. On the other hand De Passille' *et al.* (1995) noted that young calves may also be more reluctant to move in a novel environment, as younger calves have earlier been reported to run and buck less during open-field tests than older calves.

With regard to playing behaviour during each hour separately after tie releasing; Playing frequency of lactating buffaloes was the highest in the first hour (5.50 time) which differ

significantly from the rest of hours studied (2.33, 0.66 , 0.33 and 0.33 times) for second, third, fourth and fifth hours, respectively. The same trend recorded with playing period which was the highest ($P< 0.01$) in the first hour (1.36 min) and the rest of hours had lower values (0.26, 0.21, 0.04 and 0.02 min. for the second, third, fourth and fifth hours, respectively). Also, heifers were played most frequently at the first hour after release (9.20 times) followed by the second hour (6.00 time) which began to decrease significantly from the third hour (2.60 times) and fifth hour (1.00 times). The longest playing period was in the first hour (11.54 min.), and then it began to decrease significantly from second to fifth hours, (4.81, 2.11, 0.00 and 0.44 resp.). The time after tie releasing had a highly significant ($P <0.01$) effect on the playing behaviour frequency and period. This explains the decrease in the behaviour of lying, eating and rumination (Tables 1, 2 and 3) during the first hours after tie releasing. Dellmeier *et al.* (1985) found that calves from small stalls and pens ran and jumped more during an open-field test than

calves housed in larger out door hutches or pens, and suggested that this was due to a larger motivation for movement in calves without opportunity to move during housing. In addition, it was suggested that access to exercise would reduce this motivation. However, De Passille *et*

al. (1995) didn't find that previous exercise could reduce the tendency to run and jump. The Animal's status had a highly significant interaction effect with the time after tie releasing for the periods of playing.

Table 4 : Playing behaviour of lactating buffaloes and heifers during the first five hours of being released

Animal's status	Playing freq.	Playing period	hours	Playing freq. (time)	Playing period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	1.83±0.07 (time/ h.)	0.38±0.02 (min. /h.)	1 st	5.50 ^a ±0.54	1.36 ^a ±0.14
			2 nd	2.33 ^b ±0.44	0.26 ^b ±0.04
			3 rd	0.66 ^b ±0.08	0.21 ^b ±0.06
			4 th	0.33 ^b ±0.08	0.04 ^b ±0.01
			5 th	0.33 ^b ±0.13	0.02 ^b ±0.01
buffalo heifers	3.76±0.17 (time/ h.)	3.78±0.22 (min. /h.)	1 st	9.20 ^a ±1.02	11.54 ^a ±1.57
			2 nd	6.00 ^{ab} ±0.46	4.81 ^b ±0.25
			3 rd	2.60 ^{bc} ±0.33	2.11 ^b ±0.29
			4 th	0.00 ^c ±0.00	0.00 ^b ±0.00
			5 th	1.00 ^c ±0.20	0.45 ^b ±0.10
Sig.	0.01	0.01	Sig.	0.01	0.01

** Different letters within each column mean significant differences between values.

Table 5 shows agonistic behaviour of lactating buffaloes and heifers after tie releasing. Frequency of agonistic behaviour was higher in lactating buffaloes than heifers (0.90 and 0.40 times resp.) but differences were not significant. Also total agonistic behaviour period was in lactating buffaloes higher than heifers (0.43 and 0.18 min. resp.) and differences were not significant. This may be due to the heifers tend to play and social dominance is absent or reduced and class supremacy of lactating buffaloes compared to heifers; because after puberty dominance-related agonistic behaviour becomes prevalent (Bouissou, 1977). On adverse, older buffaloes were more confident and less fearful in new surroundings than younger animal (Magsi *et al.*, 2018).

Agonistic behaviour of lactating buffaloes was higher in the first hour (1.00 times) then it

began to decrease from the second hour (0.66, 0.33, 0.33 and 0.16 times for second, third, fourth and fifth hours, respectively). As a normal, agonistic behaviour period of this group was higher in the first hour then the second hour (0.90 and 0.77 min. resp.) but at the rest of hours were almost the same (0.22, 0.22 and 0.21 min. for third, fourth and fifth hours, respectively). But these differences didn't reach to significant levels. On the other hand, agonistic behaviour frequency of heifers was the highest ($P<0.05$) in the first hour (1.40 times), and the rest of hours had intermediate values 0.00, 0.00, 0.10 and 0.09 times for the second, third, fourth and fifth hours resp. Normal agonistic behaviour period of this group was the highest in the first hour (0.48 min.) but at the rest of hours were almost the same (0.20, 0.20, 0.30 and 0.20 min. for second, third, fourth and fifth hours, respectively). However, differences

were non-significant. These results could be attributed to the fact that animals direct after releasing feeling free to social interaction after long period of tying. The time after tie releasing had not any significant effect on the Agonistic behaviour frequency or period. It should mention

that In adult dairy cattle, the presence of an older and more experienced social partner reduces responses to fear-eliciting stimuli (Stenfelt *et al.*, 2022), and the presence of a few familiar individuals mitigates the negative effects of regrouping (Foris *et al.*, 2021).

Table 5 : Agonistic behaviour of lactating buffaloes and heifers during the first five hours of being released

Animal's status	Agonistic freq.	Agonistic period	hours	Agonistic freq. (time)	Agonistic period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	0.50±0.04 (time/ h.)	0.46±0.04 (min. /h.)	1 st	1.00±0.60	0.90±0.44
			2 nd	0.66±0.53	0.77±0.30
			3 rd	0.33±0.13	0.22±0.01
			4 th	0.33±0.08	0.22±0.00
			5 th	0.16±0.06	0.21±0.00
buffalo heifers	0.32±0.03 (time/ h.)	0.27±0.02 (min. /h.)	1 st	1.40 ^a ±0.30	0.48±0.11
			2 nd	0.00 ^b ±0.00	0.20±0.00
			3 rd	0.00 ^b ±0.00	0.20±0.00
			4 th	0.10 ^b ±0.10	0.30±0.00
			5 th	0.09 ^b ±0.08	0.20±0.17
Sig.	NS	NS	Sig.	NS	NS

** Different letters within each column mean significant differences between values.

Table (6) shows average affiliative behaviour of lactating buffaloes and heifers after tie releasing. Affiliative behaviour was in lactating buffaloes more frequently than heifers (0.27 and 0.16 times resp.). Also affiliative period was higher in lactating buffaloes than heifers (0.03 and 0.02 min. resp.). These differences weren't significant.

Affiliative behaviour frequencies of lactating buffaloes were significantly higher in the first hour (1.33 times) and the rest of studied hours were 0.00, 0.00, 0.00 and 0.00 times for second, third, fourth and fifth hours, respectively with free housing. As a normal, affiliative behaviour period of this group was the highest in the first hour (0.18 min.) and the rest of studied hours were 0.00 , 0.00 , 0.00 and 0.00 times for

second, third, fourth and fifth hours, respectively with free housing. These are due to Animal's reaction after being released from restraints. There were no significant differences in frequency and period among all studied hours of heifers. The affiliative behaviour frequented 0.00 times and occupied 0.00 min. In the first hour after releasing due to the heifers are preoccupied with playing behaviour (Table 4). Affiliative behaviour frequency, in the second, third, fourth and fifth hours were (0.10 , 0.09 , 0.00 and 0.09 times resp.) and affiliative behaviour period was (0.03, 0.01 , 0.00 and 0.01 min. resp.) in the second, third, fourth and fifth hours. The time after tie releasing had a highly significant (P <0.01) effect on frequency and a significant (P <0.05) effect on the affiliative

behaviour period. These results could be attributed to the fact that animals direct after releasing feeling free to social interaction after long period of tying; and explains the decrease in the behaviour of lying, eating and rumination

(Tables 1, 2 and 3) during the first hours after tie releasing. The Animal's status had a highly significant interaction effect with the time after tie releasing for the frequencies and periods of affiliative behaviour

Table 6 : Affiliative behaviour of lactating buffaloes and during the first five hours of being released.

Animal's status	Affiliative freq.	Affiliative period	hours	Affiliative freq. (time)	Affiliative period (min.)
	Means (5h.)±SE			Mean ±SE	
Lactating buffaloes	0.27±0.02 (time/ h.)	0.03±0.00 (min. /h.)	1 st	1.33 ^a ±0.17	0.18 ^a ±0.02
			2 nd	0.00 ^b ±0.00	0.00 ^b ±0.00
			3 rd	0.00 ^b ±0.00	0.00 ^b ±0.00
			4 th	0.00 ^b ±0.00	0.00 ^b ±0.00
			5 th	0.00 ^b ±0.00	0.00 ^b ±0.00
buffalo heifers	0.16±0.10 (time/ h.)	0.02±0.00 (min. /h.)	1 st	0.00±0.00	0.00±0.00
			2 nd	0.10±0.01	0.03±0.00
			3 rd	0.09±0.00	0.01±0.00
			4 th	0.00±0.00	0.00±0.00
			5 th	0.09±0.00	0.01±0.00
Sig.	NS	NS	Sig.	0.01	0.05

** Different letters within each column mean significant differences between values.

CONCLUSION

The studied behaviours differed between lactating buffaloes and heifers. The heifers tend to lie down and eat more than lactating buffaloes during the first five hours after tie releasing; Also, in terms of social behaviour, the heifers recorded higher numbers for playing behaviour compared to the lactating buffaloes, but the lactating buffaloes was higher in agonistic and affiliative behaviours than the heifers, but not significantly. During the first hours after being untethered, the animals (the lactating buffaloes and the heifer) were preoccupied with social behaviour (playing, agonistic and affiliative) rather than daily activities such as eating, ruminating and lying down. However, this trend decreases over time and moves towards stability and they tended to practice all their behaviours in a natural balance.

REFERENCES

- Alzahal, H.; Benford, J.L.; Widowski, T.; Walton, J.P.; Plaizier, J.C.; Duffield, T.; Odongo, N.E. and McBride, B.W. (2006). Effects of Frequency of Feed Delivery on Dairy Cattle Behavior. *The Professional Animal Scientist*. 22 (1): 80–83.
- Beaver, A., Caroline Ritter, Marina A.G. von Keyserlingk (2019). The Dairy Cattle Housing Dilemma. *Vet Clin Food Anim.*, 35 : 11–27.
- Bolinger, D.J.; Albright, J.L.; MorrowTesch, J.; Kenyon, S.J. and Cunningham, M.D. (1997). The effects of restraint using self-locking stanchions on dairy cows in relation to behavior, feed intake, physiological parameters, health, and milk yield. *Journal of Dairy Science*, 80(10): 2411-2417.

- Bouissou, M.F. (1977). Etude du développement des relations de dominance-subordination chez les bovins à l'aide d'épreuves de compétition alimentaire. *Biol. Behav.*, 2 (3): 213–221.
- Costa, J. H. C.; M. A. G. von Keyserlingk, and D. M. Weary (2016). Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health. *J. Dairy Sci.*, 99: 2453–2467.
- De Passille, A.M.; Rushen, J. and Martin, F. (1995). Interpreting the behaviour of calves in an open field test: a factor analysis. *Appl. Anim. Behav. Sci.*, 45: 201–213.
- Dellmeier, G.R.; Friend, T.H. and Gbur, E.E. (1985). Comparison of four methods of calf confinement II. Behaviour. *J. Anim. Sci.*, 60: 1102–1109.
- Enriquez-Hidalgo, D.; Teixeira, D.L.; Lewis, E. Buckley F.; Boyle L. and O'Driscoll K. (2018). Behavioural responses of pasture based dairy cows to short term management in tie-stalls. *Appl Anim Behav Sci.*, 198: 19–26.
- FAWC, (2009). Farm Animal Welfare in Great Britain: Past, Present and Future. Farm Animal Welfare Council. <http://www.fawc.org.uk>.
- Foris, B.; Haas, H.G.; Langbein, J. and Melzer, N. (2021). Familiarity influences social networks in dairy cows after regrouping. *J. Dairy Sci.*, 104: 3485–3494.
- Fraser, D.; Weary, D.M.; Pajor, E.A. and Milligan, B. N. (1997). A scientific conception of animal welfare that reflects ethical concerns. *Anim Welf*; 6:187–205.
- Giulioti, L.; Benvenuti, M.N.; Lai, O.; Accorsi, P. A.; Rizzuto, M.; Lotti, C.; Petrulli, C. A. and Martini, A. (2017). Welfare parameters in dairy cows reared in tie-stall and open-stall housing systems. *Anim Sci Pap Rep.*, 35(4): 379–386.
- González, L. A.; Tolkamp, B. J.; Coffey, M. P.; Ferret, A. and Kyriazakis, I. (2008). Changes in feeding behavior as possible indicators for the automatic monitoring of health disorders in dairy cows. *J. Dairy Sci.*, 91: 1017–1028.
- Haley, D.; De Passille, A. and Rushen, J. (2001). Assessing cow comfort: effects of two floor types and two tie stall designs on the behaviour of lactating dairy cows. *Appl Anim Behav Sci.*, 71(2): 105–117.
- Hernandez-Mendo, O.; M. A. G. von Keyserlingk, Veira, D. M. and Weary, D. M. (2007). Effects of pasture on lameness in dairy cows; *J. Dairy Sci.*, 90: 1209–1214.
- Herskin, M. S.; Munksgaard, L. and Ladewig, J. (2004). Effects of acute stressors on nociception, adrenocortical responses and behavior of dairy cows. *Physiology & Behavior*, 83: 411 – 420.
- Higashiyama, Y.; Nashiki, M.; Narita, H. and Kawasaki, M. (2007). A brief report on effects of transfer from outdoor grazing to indoor tethering and back on urinary cortisol and behaviour in dairy cattle. *Appl Anim Behav Sci.*, 102(1–2): 119–123.
- Huzzey, J. M.; DeVries, T. J.; Valois, P. and von Keyserlingk, M. A. G. (2006). Stocking density and feed barrier design affect the feeding and social behavior of dairy cattle. *J. Dairy Sci.*, 89: 126–133.
- Krohn, C.C.I; Munksgaard, L. and Jonasen, B. (1992). Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (Tie stall) environments I. Experimental procedure, facilities, time budgets—diurnal and seasonal conditions. *Appl Anim Behav Sci.*, 34(1): 37–47.
- Krohn, C. C. (1994). Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments. III. Grooming, exploration and abnormal behaviour. *Appl. Anim. Behav. Sci.*, 42: 73–86.
- Lobeck-Luchterhand, K. M.; Silva, P. R. B.; Chebel, R. C. and Endres, M. I. (2014). Effect of prepartum grouping strategy on displacements from the feed bunk and feeding behavior of dairy cows. *J. Dairy Sci.*, 97: 2800–2807.
- Loberg J, Telezhenko E, Bergsten C. and Lidfors L. (2004). Behaviour and claw health in tied dairy cows with varying access to exercise in

- an outdoor paddock. *Appl Anim Behav Sci.*, 89(1–2): 1–16.
- Magsi, S. H.; Haque, M. N.; Ahmad, N. and Shahid, M. Q. (2018). Short communication: Stall occupancy behavior of Nili Ravi buffaloes (*Bubalus bubalis*) when first introduced to freestall housing. *Journal of Dairy Science*. 101 (2): 1–6 .
- Mezzalira, J. C.; Carolina Bremm; Júlio Kuhn Da Trindade; Carlos Nabinger and Paulo César de Faccio Carvalho (2012). the Ingestive Behaviour of Cattle in Large-scale and Its Application to Pasture Management in Heterogeneous Pastoral Environments. *Journal of Agricultural Science and Technology*, A 2 : 909-916.
- Munksgaard, L. and Thomsen, P. (2012). Effects of cow characteristics on lying behaviour and activity in Danish dairy herds with free stalls. The First Dairy Cattle Welfare Symposium, 23-26 October, Guelph, Ontario, Canada.
- Nogues, E.; Daniel, M.; Weary and Marina A. G. von Keyserlingk (2023). Graduate Student Literature Review: Sociability, fearfulness, and coping style—Impacts on individual variation in the social behavior of dairy cattle. *Journal of Dairy Science*, 106 (12): 9568-9575.
- O’Driscoll Keelin, Laura Boyle and Alison Hanlon. (2009). The effect of breed and housing system on dairy cow feeding and lying behaviour. *Applied Animal Behaviour Science*, 116(2): 156-162.
- Popescu, S.; Borda, C.; Diugan, E.A.; Spinu M.; Groza, I. S. and Sandru, C. D. (2013). Dairy cows welfare quality in tie-stall housing system with or without access to exercise. *Acta Vet Scand*; 55(1): 43.
- Regula, G.; Danuser, J.; Spycher, B. and Wechsler, B. (2004). Health and welfare of dairy cows in different husbandry systems in Switzerland. *Prev Vet Med*, 66(1–4): 247–64.
- Silanikove, N. (2000). Effects of heat stress on the welfare of extensively managed domestic ruminants. *Livest Prod Sci*, 67: 1–18.
- Stenfelt, J.; Yngvesson, J. and Rørvang, M. V. (2022). A calm companion lowers fear in groups of dairy cows. *J. Dairy Sci.*, 105: 6923–6935.
- Tolkamp, B. J.; Haskell, M. J.; Langford, F. M.; Roberts, D. J. and Morgan, C. A. (2010). Are cows more likely to lie down the longer they stand? *App. Anim. Behav. Sci.*, 124: 1–10.
- Val-Laillet, D.; Veira, D. M. and von Keyserlingk, M. A. G. (2008). Short communication: Dominance in free-stall-housed dairy cattle is dependent upon resource. *J. Dairy Sci.*, 91: 3922–3926.
- Von Keyserlingk, M. A. G.; Cunha, G. E.; Fregonesi, J. A. and Weary, D. M. (2011). Introducing heifers to freestall housing. *J. Dairy Sci.*, 94: 1900–1907.
- Von Keyserlingk, M. A. G.; Rushen, J.; de Passillé, A. M. and Weary, D. M. (2009). Invited review: The welfare of dairy cattle—Key concepts and the role of science. *J. Dairy Sci.*, 92: 4101–4111.
- Waiblinger Susanne; Kathrin Wagner; Edna Hillmann and Kerstin Barth (2020). Play and social behaviour of calves with or without access to their dam and other cows.. *Journal of Dairy Research*, 87(S1): 144–147.
- Weimer, Shawna Leigh, (2012). “Animal-human interaction comparing live human observation and digital image evaluation methodologies. A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of Master of Science. Iowa State University. Ames, Iowa, USA.
- Winckler, C.; Tucker, C. B. and Weary, D. M. (2015). Effects of under- and overstocking freestalls on dairy cattle behaviour. *Appl. Anim. Behav. Sci.*, 170: 14–19.

تغيرات الأنشطة السلوكية بعد الانتقال من نظام الإيواء المربوط الى الطليق في الجاموس المصري

السيد الدهشان، سمير الخشاب، إلهام غنيم ، مجدى الشهاوي

قسم الإنتاج الحيواني، كلية الزراعة، جامعة المنوفية، مصر.

الملخص العربي

لدراسة ردة الفعل السلوكية للجاموس المصري (الحلاب والعجلات) للتحرر من القيد تم الإختبار العشوائي لستة عشر جاموسة مصرية، 8 جاموسات حلاب و 8 عجلات، متواجدين بوحدة بحوث السلوك الحيواني التابعة لكلية الزراعة جامعة المنوفية، شبين الكوم، مصر. تم الإحتفاظ بالحيوانات في نظام إيواء مغلق في حظيرة ذات أرضيه خرسانيه صلبه بشكل دائم؛ تم إطلاق سراحهم من القيود في الساعة 10 صباحاً لمدة 5 ساعات يومياً لمدة 7 أيام. تمت مراقبة الحيوانات المحررة من القيد بواسطة نظام تسجيل الفيديو لمدة 5 ساعات/يومياً لمدة 7 أيام، بزمن مراقبة إجمالي 560 ساعة، بإستخدام وحدة مراقبة سلوكية رقمية كاملة. اختلفت السلوكيات المدروسة بين الجاموس الحلاب والعجلات. حيث تميل العجلات إلى الرقاد (0.40 مرة/ ساعة و 3.56 دقيقة/ ساعة) وتأكل أكثر (3.00 مرة/ ساعة و 16.20 دقيقة/ ساعة) من الجاموس الحلاب (الرقاد 0.10 مرة/ ساعة و 0.87 دقيقة / ساعة وتأكل 1.26 مرة / ساعة و 7.57 دقيقة/ ساعة) خلال الساعات الخمس الأولى بعد فك القيد؛ ومن ناحية السلوك الإجتماعي أيضاً سجلت العجلات أرقاماً أعلى في سلوك اللعب (3.76 مرة/ساعة و 3.78 دقيقة/ ساعة) مقارنة بالجاموس الحلاب (1.83 مرة/ساعة و 0.38 دقيقة/ ساعة)، لكن الجاموس الحلاب كان أعلى في سلوكيات الشجار والتآلف من العجلات ولكن بصورة غير معنوية خلال الساعات الأولى بعد فك قيودها، كانت الحيوانات (الجاموس الحلاب والعجلات) منشغلة بالسلوك الإجتماعي (اللعب و الشجار و التآلف) بدلاً من الأنشطة اليومية مثل الأكل والإجترار والرقاد إلا أن هذا الاتجاه يتناقص مع مرور الوقت ويتجه نحو الإستقرار ويميلون إلى ممارسة جميع سلوكياتهم بتوازن طبيعي.