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FARMERS ATTITUDE TOWARDS COMMON PRACTICES OF BUFFALO CALVES REARING IN ROMANIAN DAIRY FARMING - A SURVEY STUDY

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Abstract

The overall objective of this study was to evaluate the results of farm size influence regarding the management practices from dairy buffalo farms. The current study was based on a survey conducted by online interviews between 2020 and 2021, with a number of 81 dairy farms from Romania. This survey aimed to establish current buffalo calves management technics in Romania along with farmer perceptions surrounding different farm size. The descriptive analysis of farm size influence on calves practices was calculated, with chi-squared tests to assess associations between variables. Concerning the colostrum administration time in buffalo calves, there were significant differences ($p \leq 0.05$) between small farms and large farms, with 0% of the large farms who feed them in first hour of life; and 80% of then small farms who use the same interval. Regarding the calves housing, cow-calf separation and milk quantity offered, we obtained that the size farm it's not a parameter to influence those variables. These results underscored how farm size plays a methodical role in shaping the management strategies employed in rearing dairy buffalo calves.

Key words*: buffalo, calf management, dairy calves, farm size, survey.*

INTRODUCTION

The buffalo (*Bubalus bubalis*) are divided in every continent, they were used for agriculture and dairy industry, being a high adoptable species with less specific food requirements (Silva et al., 2024; Vidu & Bota, 2014). Furthermore, in recent years, buffalo farming has risen to the second place in terms of milk production, with 15% of the world total quantity achieved in 2021. The growing demand for this product is stimulated by its superior nutritional qualities, as well as by the increased public awareness of its benefits (FAOSTAT, 2021; Domenico et al., 2025).

The last update of FAO from 2020 suggests that in Romania has remains 14.000 heads (Minervino et al., 2020). Furthermore, the Association of Buffalo Breeders in Transylvania, registered a little bit more, with a total of 16.721 female, the majority of the owners having traditional farms with a low average of 1.6 head, as a farm size (Jurco et al., 2022). In contrast, in the same decade, Brazil records 1.5 million head of buffaloes, with a specific area, similar with Romania, for the north part of the country (Brazilian Institute of Geography and Statistics, 2021). Within the next few years, overall population of buffalos from Romania, is recomanded to become an important component for improvement to conserving of this genetic stucture (Chiorean et al, 2024).

Accordingly, with all of these aspects, buffalo industry has an important place in agriculture, so that for a successfully production, it is important to manage the animals, with a specific treatment on the youngest calves (Silva et al., 2024).

A growing body of literature has examined the main vulnerable category in dairy farms, calves being conditioned by the intake of colostrum administration in the first days of life for acquirer immunity (Irimia et al., 2021; Lotito et al., 2023) and to survive to stressors during and after calving (Nicolao et al., 2019).

On the other hand, researcher such us Uzturk et al. (2022) underline the existence of critical points in calves rearing practices, starting from calving, colostrum feeding, cow-calf separation and calf housing. Insufficient conditions for calves can increase the morbidity and mortality at this age category, aspect that involve significant negative aspects for the farm economy. However, good management strategies can be improved to decrease the risk of pathogens in buffalo calves (Martinez-Burnes et al., 2024).
Good practices must apply in every farm, although a significant difference in calves management exists between different dimensions of small, medium or large farms (Pempek et al., 2017; Lotito et al., 2023).
Given the lack of knowledge on the effects of farm size on the rearing management of buffalo calves, the aim of the current study was to evaluate the influence of farm size, small (<50 heads) and large (>50 heads), regarding the management practices from Romanian dairy buffalo farms.

MATERIALS AND METHODS

Study population

Approximately 799 dairy water buffalo from eight Romanian farms, were chosen as study population. The buffalo population taken into the study was based on the number of respondents to the questionnaire, more of the farms are located in Transylvania area, distributed during the study period May 2020 - April 2021.
The statistical indicators reflecting the impact of farm size on the technological practices applied to buffalo calves in Romanian dairy farms were calculated using chi square test.
Because the number of respondents was limited, small and medium-sized farms were combined into a single category, named small farms. Thus, the farm size was divided into small farms with 5-50 heads (n = 5 farms) and large farms with over 50 heads (n = 3 farms).

Questionnaire design

An internet and offline questionnaire were considered by using iSondaje.ro platform (iSondaje, 2020).
In total, the questionnaire had 39 questions and was organised in 5 sections as follows: 8, 10, 4, 10 and 13 questions, respectively.
First section of the survey is with a specific focus on herd description with questions designed to capture general farm details, such as milking herd size, cow breed composition of the herd, conventional or organic farming, time for pasture and the geographic position.
Questions from the second section focussed on planning of calving including aspects regarding colostrum and milking, cow-calf separation, were considered and the results were analysed for this paper.
In the third section of the questionnaire gives a brief overview of general calf management, housing and feeding regime.
In Section 4 focus on buffalo calves feeding practices carried out on farm, considering whole milk or replacer, hay type, concentrates protein, food administration and weaning management.
The last section 5 is concerned exclusively on buffalo calves' health and veterinary care.
The questions found in the formulary were open questions, multiple choice, closed and semi-closed questions. The initial testing of the survey was previously performed on a number of 5 farmers from different categories of farms for a good understanding of the questions.

Data analyses

The questionnaire was completed based on telephone interviews, farm visits and online forms; their management being discern by a single interviewer.
All records were individually examined to rule out improbability and the data were recorded in Microsoft Excel 2019 (Microsoft Home & Business English Eurozone). Data were analysed using descriptive statistics applying Chi-square test.
We compare the results to current Romanian and international dairy buffalo industry recommendations.

RESULTS AND DISCUSSIONS

Usage of calving pens, milk type, and cow-calf separation

Data regarding the usage of calving pens, milk type, and cow-calf separation are presented in Table 1.
With a good supply of rearing and health practices in the first three months of buffalo calves, farmers will success in breeding this

species with high performance as adult (Lotito et al., 2023; Silva et al., 2024). Therefore, in small dairy buffalo farms from Romania, calving housing it is practiced in proportion of 80%, while in large farms, regarding pus study, equal proportions of 33.33% are calculate for every type of housing: individual pens, collective pens (Figure 1) and cow-calf contact. Concerning to milk feeding regime, in buffalo dairy farms, all the responds with small farms (100%) and 66.66% of large farms, are using whole milk for the calves.

Figure 1. Buffalo calves housing in collective pens (Own source)

According to the results of the questionnaire, the buffalo cow - calf separation is carried out after 12 or 24 hours postpartum, with 40% for each interval. On the other hand, in large farms (>50 heads), the separation was in proportion of 66.66% abrupt and 33.33% after 12 hours postpartum. These data are in accordance with previous studies where the calf separation from the buffalo mother is carried out 24-48 hours after calving (Mota-Rojas et al., 2019).

The time of first colostrum administration, quantity of first colostrum meal and check the colostrum quality

Table 2 introduce the results concerning the influence of farm size on the time of first colostrum administration, quantity of first colostrum and check the colostrum quality, in buffalo dairy farms.

Accordingly, with the data obtain from the survey, the time for first meal of colostrum has registered only two variables, respectively 1 hour and 1-4 hours *post-partum*, the other variables, 4-6 hours and more then 6 hours were not recorded in the table. However, the timing for the first colostrum meal in the small farms, is carried out in 80% of the time, in the first hour after birth, and the rest of the 20% are manage this in the 1-4 hours interval.

On the other hand, in large buffalo farms, the first colostrum meal is run in the interval 1-4 hours *post-partum*, in a percentage of 100%, according to the questionnaire. This can be based on the fact that in large farms, given the behaviour of buffaloes to withdraw from the herd when calving (De Rosa et al., 2009; Mota-Rojas et al., 2019), they can be identified later through farmers so as to ensure the colostrum of the calves in the shortest possible time. Statistical differences were recorded when comparing small with large farms ($p \leq 0.05$). Furthermore, researchers such as Sturaro et al. (2020), recommend feeding the calves within a maximum interval of 3 hours after calving, with the high-quality colostrum, for superior absorption of immunoglobulins.

In percent of 60% of Romanian farmers, according to the survey, they give an amount 2-4 liters of colostrum to the buffalo calves at the first meal, and the other 40% are giving amounts under 2 liters of colostrum, considering small-sized farms. Regarding the amount of colostrum administered at the first calving, the response option over 4 liters was excluded from the table, because no respondent checked this option.

In large farms, the proportions are 66.66% for the amount 2-4 liters, and 33.33% for amounts under 2 liters. The results obtained are reliable with previous research, where Godden et al. (2019) recommend ingesting an amount of at least 10% and at most 12% of a calf's body weight. In addition, Morin et al. (1997) and Agrawal et al. (2022) found that the most effective immunological capacity for a new born calf is the amount of 4 liters of colostrum for the first meal. Statistical consequences were not recorded for the influence of farm size on the amount of colostrum administered at the first meal.

Table 1. Means (± SEM) CHITEST for usage calving pens, milk type, and cow-calf separation based on farm size

Farm size	Calving pens (%)			Milk type (%)		Cow-calf separation (%)			
	Individual pens	Collective pens.	Cow-calf contact	Whole	Mixt	Abrupt	>12h	>24h	Other
Small farms	0	80	20	100	0	0	40	40	20
Large farms	33.33	33.33	33.33	66.66	33.33	66.66	33.33	0	0
TOTAL	**12.5**	**62.5**	**25**	**87.5**	**12.5**	**25**	**37.5**	**25**	**12.5**
Small vs. Large	NS (0.293)			NS (0.167)		NS (0.160)			

NS p>0.05; * p≤0.05; ** p≤0.01; *** p≤0.001.

According to the questionnaire, in 100% of the dairy buffalo farms in Romania, farmers do not practice checking the quality of colostrum, regardless of the size of the farm of origin. According to previous studies, a high-quality buffalo colostrum has increased concentrations of lactose, fat, vitamin E, A, minerals such as P, Mg, K, Zn, lactoferrin, lysozyme, growth factors, total solids as well as a significant immunological load (Lotito et al., 2023), anti-inflammatory properties (Stoy et al., 2013) antimicrobial or nutraceutical (Ahmadi et al., 2011). In addition, the quality of buffalo colostrum can be analysed using equipment such as a refractometer or colostrometer, the Brix refractometer being the most accessible and handy (Lotito et al., 2023). The statistical results did not show significant differences regarding the influence of farm size on the quality of buffalo colostrum in Romania.

Table 2. Means (± SEM) CHITEST for farm size influence on the time of first colostrum administration, quantity of first colostrum and check the colostrum quality, in buffalo dairy farms

Farm size	First colostrum administration (%)		Quantity of first colostrum meal (%)		Check the colostrum quality (%)	
	0-1h	1-4h	< 2l	2-4l	Yes	No
Small farms	80	20	40	60	0	100
Large farms	0	100%	33.33	66.66	0	100
TOTAL	**50**	**50**	**37.5**	**62.5**	**0**	**100**
Small vs. Large	***(0.028)***		NS (0.850)		NS (1.000)	

NS p>0.05; *p≤0.05; **p≤0.01; ***p≤0.001

Table 3. Means (± SEM) CHITEST for farm size influence on the colostrum administration method, colostrum bank and milk method administration, in dairy buffalo farms

Farm size	Colostrum administration method (%)		Colostrum bank (%)		Milk administration method (%)		
	Bottle	Natural suckling	Yes	No	Bucket	Bottle	Natural feeding
Small farms	0	100	20	80	0	20	80
Large farms	66.66	33.33	33.33	66.66	33.33	66.66	0
TOTAL	**25**	**75**	**25**	**75**	**12,5**	**37.5**	**50**
Small vs. Large	***(0.035)***		NS (0.673)		NS (0.075)		

*NS p>0.05; *p≤0.05; **p≤0.01; ***p≤0.001.*

Colostrum administration method, colostrum bank and milk method administration

Results regarding the method of colostrum administration method, the existence of a colostrum bank and the adoption of the practice of checking the quality of colostrum in dairy buffalo farms, are presented in Table 3.

Regarding the results on the colostrum administration method, the only variable checked by farmers were the bottle/teat and natural sucking from the buffalo cow. The other two options mentioned in the survey, bucket and esophagogastric tube, were eliminated from the table. Moreover, in small-sized farms, natural feeding is an exclusively option to feed the buffalo calves. In contrast, in large farms teat bucket or bottle, was used in a proportion of 66.66%, and natural suckling, is only 33.33% of the interviewed farms. Usualy, the calves feed themselves from the buffalo

dam, without the farmers intervention, as these species are semi-wild animals.
Sometimes buffaloes has different behaviour, especially the primiparous ones, when they refuse the calves (Mota-Rojas et al., 2022), and thus using a teat bottle/buckets or an esophagogastric tube is indicated to administrate the colostrum, which has proven to be the most effective in terms of establishing immunity (Mota-Rojas et al., 2022).
As a practice in dairy buffalo farms, colostrum bank existence, according to the questionnaire 75% of them do not have such a stock, regardless of the size of the farm, large or small. On the other hand, in small-sized farms, 20% of the farmers own a colostrum bank, and in large farms, the percentage rises to 33.33%. A pattern is observed at the level of our country, for the lack of implementation of colostrum banks in farms, because in the case of buffalo farms, this practice has a high percentage of its absence with 66.66% in large farms and 80% in small farms.The need for a colostrum bank is a vital practice for the health of the calves immediately after birth, especially if the buffalo dam has a low amount of colostrum or with a poor quality (Costa et al., 2023).
According to the surveyed farms, milk administration method, were considered three options, such as bucket, teat bottle and natural feeding from the buffalo dam. Automate milk feeder was not an option for Romanian farmers, so it was not included in the processed data.
Thus, in small farms, natural feeding is used in 80% of the interviewed farmers. The adjustment of small farmers to feed calves by natural feeding from the buffalo dam may be due to the stimulation of this species to produce milk in the presence of their own calves, thus the process being easier to manage (Borghese et al., 2007). On the other hand, in large farms, the situation is in contrast, since 33.33% offer milk to the calves in a bucket, 66.66% use a teat, and natural feeding being not an option. The results are similar with Italian farms, where calves are fed with teat bottles in the intensive buffalo breeding system (Borghese et al., 2007). Statistically significant data ($p = 0.075$) were not recorded, however it can be observed a tendancy, in terms of the method of milk administration to calves.

Milk quantity administration, water access and age hay access

Analysed data regarding the amount of milk administered, water and hay access for calves are detailed in Table 4. Parameters such as “under 2 liters” and “8 liters”, regarding the amount of milk administered to calves, were removed from the table, because no farmer checked these options.

Table 4. Means (± SEM) CHITEST for farm size influence on the milk quantity administration, water access and on the age hay access, in buffalo dairy farms

Farm size	Milk quantity administration (%)			Water access (%)	Age hay access (%)		
	Ad libitum	4 l/day	6 l/day	Ad libitum	1-3 weeks	4-8 weeks	> 8 weeks.
Small farms	80	20	0	100	40	60	0
Large farms	0	66.66	33.33	100	0	66.66	33.33
TOTAL	**50**	**37.5**	**12.5**	**100**	**25**	**62.5**	**12.5**
Small vs. Large	NS (0.075)			NS (1.000)	NS (236)		

NS $p>0.05$; *$p\leq0.05$; **$p\leq0.01$; ***$p\leq0.001$.

In addition, 80% of small farms, regarding the survey generated data, offered *ad libitum* access to milk, and 20% the amount of 4 liters/day. On the other hand, in large farms, the percentage is different, calves are fed 4 liters of milk per day in a percentage of 66.66%, while 33.33% of respondents feed them with 6 liters/day. These values are in accordance with previous studies, where the proportion of milk recommended to be ingested by calves, regardless of species, is within the range of 10-12% of the animals weight (Godden et al., 2019). No significant differences were recorded, however we can observe that there is a trend regarding the influence of farm size on the amount of milk administered to buffalo calves.

The farmers responses were unanimously in favor of ad libitum water access for 0-3 months calves aged, the other options of 2 liters/day and 5 liters/day not being taken into account, and thus were not included in the table. The results are in agreement with previous research in which water intake at a young age is recommended for rumen development and feed digestion (Macovski, 2018; Dairy-cattle, 2019). In addition, Council Directive 2008/119/EC of 18th of Decembre 2008 specifies the importance of water, especially after the age of two weeks and especially during droughty periods.

According to the survey data, hay access in buffalo calves in small-sized farms is it starting aroung 4-8 weeks of life, for 60% of the farms, and for the rest of 40%, this feeding regime is it starting earlier, from 1-3 week after birth. Furthermore, hay access in large farms is 66.66% from 4-8 weeks of live and 33.33% at ages over then 8 weeks of life. Previous research has shown that hay access at young ages brings calf digestive development in the same way as feeding with starter feeds (Francia et al., 2009). Studies on this variable are limited, so that statements can be strictly in the form of an supposition. Statistical data have not been recorded regarding the age of hay access to buffalo calves.

CONCLUSIONS

According to the results obtained, the moment and the method of colostrum administration in water buffalo calves are factors that can are influenced by the size of the farm. However, colostrum management in the first period of life, in calves, can promote better productive management of buffalo calves in the face of possible health issues.

In addition, practices regarding milk feeding, housing, colostrum bank, cow-calf separation, water and hay access, cannot be considered to be influenced by such a factor studied.

Considering the results obtained in this study, the success for a health and strong adult buffalo, it's crucial to respect and understanding the management of calves in first three months of life. Moreover, significant differences could be determined between small and large sized of Romanian buffalo farms.

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