

Study Regarding Calves Health Practice from Birth to Weaning on Romanian Dairy Buffalo Farms, Considering Farm Size

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Abstract

This study explores the health management practices applied to dairy buffalo calves in Romania from birth to weaning, with a focus on preventive strategies and main disease occurrence in relation to farm size. The data were collected through a structured questionnaire distributed among a limited number of Romanian dairy buffalo farms, reflecting the relatively low national prevalence of this farming system. The most commonly reported preventive methods against technopathies included vitamin and selenium supplementation as well as environmental condition adjustments. However, due to the small sample size, the availability of comprehensive statistical data was limited. Preventive vaccination was not widely practiced among buffalo farmers. Large-scale farms reported the use of vaccines, small farms did not apply vaccination at all, indicating a gap in biosecurity and preventive care. Regarding disease occurrence, the incidence of renal disorders, diarrhoea, and respiratory diseases among buffalo calves remained consistently low, below 5%, and showed no significant variation based on farm size. These findings suggest that while certain basic health practices are implemented, more structured preventive programs could benefit the overall health outcomes of buffalo calves, particularly in smaller farms where preventive measures are minimal or absent.

Keywords: calf health management, dairy buffalo farms, farm size effect, preventive practice

1. Introduction

Globally, the need for food is increasing due to population growth, and both meat and dairy products represent significant components for human diets [1].

In recent decades, buffalo dairy farming has experienced a notable global expansion, primarily due to the superior compositional attributes of buffalo milk, which exhibits elevated concentrations of protein and lipids compared to bovine milk, thereby positioning it as the second most exploited milk source worldwide [2].

Historically, the taming of water buffalo by local populations was driven by their remarkable draught capacity and resilience, particularly in the Danubian lowlands and Transylvanian region [3]. The species demonstrated a high degree of ecological plasticity, adapting to the local pedo-climatic conditions and undergoing reproductive isolation over successive generations [4]. As a result, buffalo herds thrived until the early 20th century, becoming integral to the subsistence strategies of rural agriculture systems.

Farm size influences the global milk production and the economic part of this sector [5,6]. Large farms can benefit from economies of scale, using advanced technologies and managing resources efficiently. However, there are concerns about sustainability and animal welfare, and large farms

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can hold a large number of animals, generating challenges in terms of managing rearing technologies, health and maintaining ethical standards [5;7;8]. Thus, the main diseases frequently found in calves aged 0-3 months are represented by gastrointestinal infections, followed by respiratory tract infections, navel injuries or joints and congenital defects [9]. Moreover, the primary cause for calves' losses, it was demonstrated many times being neonatal diarrhoea [10].

On the other hand, researchers such as [11] have demonstrated the existence of critical points in rearing technologies, starting from calving, colostrum feeding, cow-calf separation and calf housing (Figure 1).

Due to the development of new intensive farming methods, each country has adopted different practices in calves rearing, depending on the animal breed on the farm [12] or the productive destination (young fattening, dairy or meat).



Figure 1. Buffalo calves housing

For example, in the United States there are remarkable differences in calves rearing, most of them are aspects about rearing systems dependent on the size of farms [13]. Thus, identifying the main risks in animal welfare, is the first step in adopting different and effective practices for each farm [14,15]. Over time, researchers such as [16] have found that farm size is one of the risk factors that contribute to the degree of contagiousness of diseases among calves, with a strong correlation between farm size and the incidence of the main infectious diseases. In Romania, the majority of dairy farms (approximately 90%) are represented by small family farms, with a total number of maximum 25 heads [17]. Between 2005 and 2016, the largest decrease in the number of farms in the

European Union-27 was recorded in Romania, with a decrease of 0.8 million farms, representing approximately 20% of the total number of farms in the country [17].

Given the lack of knowledge on the effects of farm size on calf rearing practices, especially in buffaloes, the aim of this study was to evaluate the rearing practices adopted in dairy farms in Romania, thus considering buffalo farms: small and medium (5 - 50 heads); large (> 50 heads).

2. Materials and methods

Study Population

The study population was based on the number of the questionnaire responses, disseminated to Romanian farmers, during the study period from May 2020 to April 2021. The survey totalled 8 respondents on buffalo farms. The total number of animals included in the study are of 799 milk buffaloes.

Method

To obtain the data, we created an online questionnaire, through the www.isondaje.ro platform (iSondaje, 2020) and word file. The questionnaire includes a total of 40 questions regarding the growth technologies and health of 0-3-month-old calves from dairy buffalo farms in Romania.

In this chapter, we addressed only one element of section 1 of the questionnaire, which focused on descriptive data on general aspects of the farm, for example, the size of the farm; the other four sections (on farm organization, housing, feeding and calf health) being used in their entirety as a database.

The farm sizes were distributed as follows: small farms, 5-50 buffalo heads, with a total of 5 farms, and large farms with over 50 heads, thus obtaining values from 3 such farms. We combine small and medium farms, in a single size category, to facilitate the statistical analysis.

To study the health parameters of 0-3-month-old calves in dairy buffalo farms in Romania, the following parameters were used: incidence of diarrhoea, respiratory diseases, deworming and vaccinations in 0-3-month-old calves and method of preventing technopathies.

Data analysis

We grouped the answers obtained according to the number of animals present in each farm. Thus, the responses were ranked by farmer, from the smallest

farm, which totals 5 heads, to the most developed dairy farm, with a total number of 362 heads.

For each parameter taken into the study, the chi-square test of independence was performed to determine the relationships between the health of the buffalo calves and the size of the farm. We use statistical hypothesis at the 0.05 significance level.

3. Results and discussion

Table 1 presents data on the influence of farm size on the incidence of diarrhoea, respiratory and kidney diseases in dairy buffalo calves, according to the questionnaire conducted in 8 farms from Romania. The incidence of diarrhoea is in 75% of small-sized farms (n=5) and 33.33% in large farms (n=3), is less than 5%. Notable values were also for the incidence of 5-15% in 33.33% of large farms. Diarrhoea incidence values between 15-25% and >35% were not recorded in buffalo

calves in any of the two farm sizes. On the other hand, researchers such as [18] found that diarrhoea has higher incidence (86.67%), followed navel ill (81.67%) and pneumonia (50%). These regards classify large farms as having a higher susceptibility to disease among buffalo calves.

No statistical differences were recorded between small-sized farms and/or large farms ($p>0.05$). This may be due to effective management factors (breeding, housing and feeding) for buffalo calf care. Furthermore, buffalo are a species more resistant to the environment than dairy cows [19]. Moreover, small farmers pay more attention to calves' husbandry, unlike the large buffalo farmers [18].

The major factors that can affect the spread of pathogens that contribute to the development of enteritis are temperature, humidity and air flow [20], housing conditions [16], population density and calf group size [21], as well as farm hygiene [16].

Table 1. Farm size influence on the incidence of calves diarrhoea, respiratory diseases and renal affections, from dairy buffalo farms

Farm size	Diarrhoea incidence (%)				Respiratory disease incidence (%)		Kidney disease incidence (%)	
	< 5	5-15	25-35	Not applicable	< 5	Not applicable	< 5	Not applicable
Small farms	75	0	0	25	60	40	60	40
Large farms	33.33	33.33	33.33	0	100	0	100	0
TOTAL	62.5	12.5	12.5	12,5	75	25	75	25
Small vs. Large farms	NS (0.204)				NS (0.205)		NS (0.205)	

NS $p>0,05$; * $p\leq 0,05$; ** $p\leq 0,01$; *** $p\leq 0,001$.

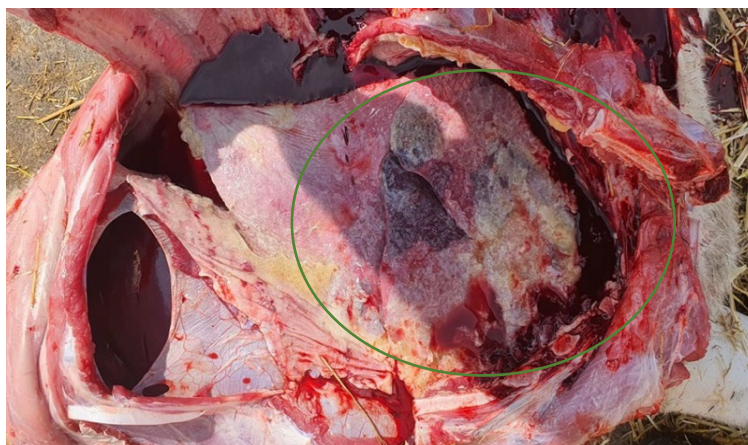


Figure 2. Aspects regarding respiratory diseases in calves, catarrhal bronchopneumonia

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Analysing data on the incidence of respiratory diseases (Figure 2) in buffalo calves, we observe that in 60% of small farms, the incidence is below 5%; and in 40% of the farms such a condition has never existed. In contrast, in all the large farms,

the incidence was on average under 5%. Also, incidence values the intervals such as 5-15%, 15-25%, 25-35% and over 35% were not recorded for this studied factor. There results are in discordance with [18] and [22], where they found higher percentage of respiratory disease in buffalo calves, with a higher level of 50%.

Results on the incidence of kidney disease in calves, in small farms, 40% had never encountered this condition and, in 60% of the farms, the disease rate was below 5%. On the other hand, in large farms, all respondents stated that the incidence of kidney disease in buffalo calves was under 5% of the farm's population.

It is worth noting that in the incidence ranges of 5-15%, 15-25%, 25-35% and above 35% no farmer recorded values for kidney disease in buffalo calves. In the present study, no significant results were obtained regarding the incidence of kidney disease in buffalo calves. In previous studies,

discussions were presented regarding the effect of season and environment on the health status of ruminants, including buffaloes [23]. In order to measure the health status of buffaloes, parameters such as white blood cells are considered to be important indicators compared to other specific parameters [23].

Data about the farm size influence on the buffaloes technopathies preventing methods, vaccination and deworming, can be seen in Table 2. Technopathies prevention, according to the questionnaires carried out, was based on practices such as vitamins apport (40%), selenium intake (20%) and environmental conditions correction (40%) for small farms. On the other hand, in large farms, values of 66.66% were obtained for vitamin intake, 0% for selenium intake in the food ration of buffaloes and buffalo calves, and 33.33% for environmental conditions correction.

Table 2. Farm size influence on the calves technopathies preventions, vaccination and deworming, in dairy buffalo farms

Farm size	Calves technopathies prevention (%)			Vaccination (%)		Deworming (%)	
	Vitamin	Selenium intake	Environmental corrections	Yes	No	Yes	No
Small farms	40	20	40	0	100	60	40
Large farms	66.66	0	33.33	66.66	33.33	100	0
TOTAL	50	12.5	37.5	25	75	75	25
Small vs. Large farms	NS (0.641)			* (0.035)		NS (0.205)	

NS $p > 0,05$; * $p \leq 0,05$; ** $p \leq 0,01$; *** $p \leq 0,001$.

The practice of vaccination as a preventing method in buffaloes, according to the questionnaires carried out, led to obtaining 75% of the results for farmers who do not want to vaccinate buffalo calves on their farm.

Deworming of buffalo calves in small-sized farms was recorded at 75% for the implementation. On the other hand, in large farms, deworming is practiced at 100%. These results can be adopted to prevent farm animal disease, to avoid large economic losses. Opposite, [18] emphasize that in his study, all the farmers, regardless of the farm size, they are not using deworming prevention. This situation, generate higher calf mortality and, unfortunately wide economic losses.

Dehorning of buffalo calves, unlike bull calves, is an unusual practice, this being not practicable in any of the farms under study. Furthermore, [18] found similar results, where none of the farmers,

regardless of farm size, are not practicing buffalo calves dehorning.

Both the methods of technopathies preventing, as well as vaccination and deworming of calves, were not statistically influenced by the farm size factor, considered the study. Unfortunately, data on the health of buffalo calves are very deficient, the results obtained can only be put hypothetically.

4. Conclusions

The most common technopathies preventing methods are represented by vitamin and selenium intake, and environmental conditions correction. Statistical, data were recorded in small numbers, this being caused by the low number of buffalo farms from which we were able to collect health data on buffalo calves.

Preventive vaccination is not common among buffalo farmers; however, it is influenced by the size of the farm, being practiced in large farms, and being completely absent in small farms; The incidence of kidney diseases, respiratory diseases, diarrhoea, among buffalo calves, is not influenced by the size of the farm, being ranked below 5%.

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