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REARING CONDITIONS AND HEALTH STATUS OF CALVES ON SMALL RURAL FARMS

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Abstract: Good rearing conditions are the key factor for health and welfare of calves. Diarrhea, respiratory and navel infections are commonly referred to as the most common health problems in calves. The aim of this study was an observation of rearing conditions and the occurrence of the most common health problems in calves on small rural farms in Danube Region of Serbia. Data were colected from 30 farms by surveying the farmers. The questionary consisted of 75 questions pertaining to the following: general information on the farm, and on calving, nutrition, weaning, housing, hygiene of space for cows and calves, on calf diseases and diseases prevention measures. According to the answers, the average number of all categories of cattle at the fams is 18 heads. Calves are separated from their mothers immediately after birth at 67% farms. They receive colostrum up to two hours after birth at 47% of the farms and immediately after birth at 20% of the farms. Average age of calves at weaning is 13 weeks. Calves begin to use hay usually between the 1st and 2nd week of life, and a concentrated feed in 2nd week. They are held in different types of pens. Farmers specified diarrhea and respiratory diseases as the most common health problems in calves. Rearing conditions at the farms often do not meet the recommendations and the breeders do not implement all of the necessary preventive measures. Corrections in this regard could contribute to better health of calves.

Key words: calves, small farms, rearing conditions, health problems

Introduction

Cattle breeding in Serbia represent a very important branch of livestock production, which is predominantly based on small family farms. According to the

2012 census, rural households have an average of 5.1 head of cattle of all categories. Milk production is carried out on farms with an average capacity of 2.8 heads. The most numerous are farms with 1 or 2 cows and in such farms there are about 66% of the total number of dairy cows in Serbia (*Arsić et al., 2011; Popović, 2014*). Beside dairy cows, on these farms, other types of animals are usually grown in order to meet the needs of the household for milk, meat and eggs, which implies numerous possibilities for transmitting and spreading contagious diseases (*Relić, 2014*). The occurrence of disease in calves reflects on the growth and further development, but also on the production traits in adulthood, if the individual does not die. Infections can occur in the first days of life, and the most common health problems of calves are diarrhea, respiratory infections and omphalitis. Calf mortality in the first months of life ranges between 5 and 10%, and the target in calf rearing should be mortality below 5% in the mentioned period (*Miljković and Veselinović, 2005*).

Development of infectious diseases depends on the relationship between the infectious agent-host, which is affected by the environment and the breeding technology. The task of the breeder is to prevent the development of disease by applying recommended prophylactic measures, and for successful control, knowledge of as many factors as affects its occurrence is needed. For example, frequent risk factors for the appearance of diarrhea and respiratory diseases in calves are: hygiene of calving area, feeding, housing (individual or group pen), high ammonia concentration and exposure to the draft *(Samolovac, 2016).*

First measures which should be taken are relating to adequate food and accommodation of pregnant cows. Special attention is paid to the act of calving and procedures that accompany it, and then to the colostral and milk feeding, the availability of clean water and to accommodation for calves. In order to protect against infections, especially of gastrointestinal tract, calf is kept individually in the first week of life, and later in group pen. Adequate hygiene of all surfaces, mattress and equipment, as well as sufficient light and clean air, positively affect the vitality of calves and prevent the occurrence of the most common diseases. (*Hristov, 2002*; *Romčević et al., 2007; Lorenz et al., 2011; Relić et al., 2014; Samolovac, 2016; Relić et al., 2017a*). This paper presents data on specific calf management practices and the occurrence of the most common health problems in calves on small rural farms in the Danube Region of Serbia.

Materials and Methods

Information on rearing conditions and health problems of calves, related to the period of the previous 12 months, were collected in 30 households in the Danube Region, located in the territory of the municipalities of Velika Plana and

Smederevska Palanka. The data were collected by questioning the owner of the farm, and in cooperation with the competent veterinary service, during the regular actions of the vaccination of animals.

The survey consisted of a total of 75 questions related to the following: general information on the farm, and on calving, feeding, weaning, nutrition, housing, hygiene of space for cows and calves, on calf diseases and diseases prevention measures. The collected data have been summarized and processed by the Microsoft Office Excel 2010 package. The results are displayed as integers, and due to the amount of data, except tables and charts, they are also shown in the text.

Results and Discussion

General data

According to results from the questionnaire, the dominant type of livestock production in Danube region is cattle breeding (50% farms). All of the farms are of conventional type (100%), the most often with combined production of milk and meat (58%). The most common is Simmental type of cattle (63%) and, on average, the farms own 18 heads of all categories of cattle (Table 1). This is approximately the same as data by Popović (2014), according to which family farms with up to 19 heads of cattle account for 97% of households in the Republic of Serbia.

Data shows that breeders mostly do not know the reason of calf's death. Secondly, they mentioned respiratory diseases and diarrhea as the cause of mortality in calves. As reasons for loss due to accidents, the breeders mentioned the unprofessional aiding during the difficult calving and some inadequate rearing conditions, which resulted in injuries to calves with a fatal outcome. The occurrence of death due to such reasons indicates that on some farms calves are not kept and treated according to the regulations, such as the Regulation on animal welfare conditions (*Anon., 2010*). Inappropriate care of the animals may be related to insufficient manpower, motivation and personal traits of breeders (*Samolovac, 2016*). On the examined farms is a small number of working-age population and the highest percentage of breeders have only a high school completed (Table 1). Similar to the previous, ignorance of the cause of death may be related to the lack of experience, training or interest from the breeders in the study. The situation is similar in other countries. For example, for breeders in Brazil, the world's fifth milk producer, the reason for about 38% of calves' death cases is unknown. The fact that farmers struggled to identify the cause of death highlights the lack of knowledge of signs that could aid them to tackle disease on time and apply preventive measures (*Fruscalso et al., 2017*).

Table 1. General data on cattle farms

Parameter	Answers offered in the questionary	Results
Average number of cattle	• total • cows • calves up to 6 months	18 8 7
Cases calves' death of up to 6 months of age (% of the farms)		33
Causes of calves'death (% of the farms with death cases)	• diarrhea • respiratory diseases • accidents • malformations • unknown	15 25 10 5 45
Average number of household members	• total • men • women • underage	4 2* 1 1
Average age of the person who manages the household (i.e. breeder)		49
Breeder's education (% of breeders)	• does not want to answer • college • not completed elementary school • elementary school • high school	3 7 7 30 53

* Workers (men) are occasionally hired at 17% of the farms

Managing and housing of cows and calves

In 80% of the farms bed for expecting cow is cleaned (i.e. dirty straw is replaced by fresh) two or more times a day; in 10% is cleaned once a day and in 10% more times a week. For cows in the phase of transition, wich is usually defined as the period of 3 weeks before and 3 weeks after parturition, a clean and comfortable space is needed. Disturbed rest and uncomfortable resting areas in this period may result in a physiological stress response increasing the susceptibility to disease. Furthermore, during the calving, cows are agitated and often change their position, so special attention should be placed on cow comfort in the maternity i.e. calving pen, particularly to aspects of stall surface known to affect comfort when changing positions (*Huzzey et al., 2005*). However, according to the survey results, none of the farms has a pen for calving and at the calving time the cow remains tethered in place (93%) or is moved to a separate stall bed that is in the same facility (7%).

During calving, the most breeders always provide help to the cow (57%), while others help only in the case of distocia (27%), occasionally (13%), or they call a veterinarian for help (3%). Mainly farmers with a higher number of cows provide assistance from time to time, due to the lack of adequate manpower, which would enable the timely performance of all jobs on the farm.

The breeders usually separate the calf from the mother immediately after birth (67%), which is in line with the usual technology on commercial farms; in 26% farms calves stay longer with their mother, usually all the period until they suck, and in 7% they remain until mother dries them after birth. The cow should be allowed to lick the calf after birth. If the cow does not lick the calf, the newborn should be dried with clean cloths. This practice not only dries the calf but stimulates the calf's blood circulation (*Amaral-Phillips et al., 2006*).

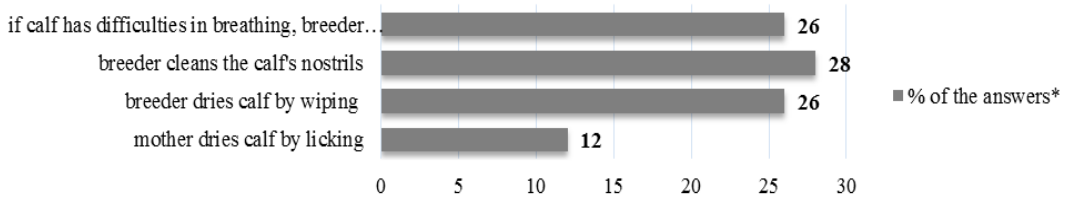

Chart 1. Providing assistance to newborn calf (*multiple answers)

Data from the Chart 1 indicate that breeders do not give enough necessary care to the newborn calves. This is also supported by the fact that 7% of breeders never wash the pen for newborn calf; 46% of them wash the pen after each calf, and 47% of breeders wash it several times a year. Regular cleaning and desinfection of all surfaces in the stall, especially the floor of the pen is significant for reduction of the infectious pressure and the occurrence of conditional diseases, as is described by *Hristov* (2002).

The calves are housed in different types of pens, whose average surface is in accordance with the recommended values (*Anon., 2010*). They are most often together with adult cattle (73%). In others, baby calves are housed separately (13%), or together with older calves (7%), or tied outside the stall (7%). According to the Regulations (*Anon., 2010*), calves should not be tied.

The straw in the calf pen is completely changed in different intervals, depending on the farm: every day (22%); every two days, with adding the fresh in the meantime (38%); and once a week (33%) or once in two weeks (7%), with adding fresh straw every day.

Ventilation in buildings is mostly natural (60% of farms) and is carried out by opening windows and doors; 17% of the farms also have a fan, while on other farms, calves are kept in semi-open structures (20%) or outside (3%).

Calf feeding and weaning

On most of the farms (60%) breeders do not let calves suck their mothers but use buckets with a nipple to feed the calves; 55% of them use one bucket for more calves, and 45% have a separate bucket for each calf. The buckets are washed after each use (50%) or at least once a day (50%), but only 15% of the breeders use the detergent when washing.

Of the remaining 40% farms where the calves suck, most breeders wash the cow's udder only if it is dirty (23%), some of them always do udder washing before the calf begins to suck (14%), and some do not wash it at all (3%). Failure to implement adequate hygiene measures before sucking and feeding calves in a large extent leads to more frequent occurrence of diseases in calves (*Samolovac*, 2016).

Hygiene measures contribute the calf is less exposed to pathogenic microorganisms from the environment. Beside that, the two most important factors in newborn calf survival are warmth and colostrum. Time after birth at which colostrums is first fed is critical to determining if the calf will acquire an adequate passive immunity and its ability to defend against disease. Calves that don't nurse within 2 to 4 hours after birth often die or become weak and unable to nurse and starve (*Relić et al., 2014*).

According to the responses, the average amount of colostrum that breeders offered to the calf at the first feed is 2 liters, which is in accordance with the capacity of abomasum in the first hours of life. More than half of them know that timely provision of colostrum is very important for calves' health, and mostly they allow calves to consume it within 2 hours of birth (Table 2).

In calves which do not sucking, the temperature of the colostrum, and later the milk (or milk replacer) should be as close as possible to the calf's body temperature, but not below 37 ºC (*Romčević et al., 2007; Lang, 2008*). Given that quite a high percentage of breeders do not check the temperature, and of those who do it, more than two thirds use hand to determine the temperature, it is not certain that the temperature of colostrum/milk is in accordance with the recommendations. There are also a worryingly high percentage of breeders that can not provide additional heating of the milk prior to the administration, as well as those who do not carry out quality checks prior to the administration of colostrum (Table 2). On the other hand, it is positive that most breeders freeze the colostrum. Freezing and storing surplus colostrum of healthy cows allow appropriate feeding the calves even if there is insufficient quantity of fresh colostrum (Relić et al., 2014). However, thawing colostrum at the room temperature is not reccomended, as bacteria double every 20-30 minutes at room temperature (*Lang, 2008*).

Table 2. Colostral/milk feeding characteristics

Parameter	Answers offered in the questionary	Results (%)
Time of the first colostrum consumption	• immediately after birth • up to 2 hours • up to 6 hours	20 47 33
Breeders awareness of the importance of timely administration of colostrum in relation to the health of calves	• no impact at all • little impact • some impact • significant impact • very significant impact	10 7 20 10 53
Colostrum quality checking before administration	• no checking • only rejecting the first streams • something else	77 17 13
Storage of surplus colostrum in the freezer	• yes • no	70 30
Method of thawing colostrum	• at the room temperature • in the warm water (39 °C) • in the microwave oven	33 56 11
Colostrum/milk temperature checking	• never (calf is sucking) • never • always • occasionally	40 23 14 23
Method of colostrum/milk temperature checking	• by hand • by thermometer	73 27
Milk reheating before administration	• no • yes (mixing milk and warm water) • yes (placing milk container in hot water) • something else	44 3 20 33
Amount of powder mixture (milk replacer) that is mixed with water	• no use of milk replacer • according to the manufacturer • uses a larger amount than required	70 27 3

On 40% of farms weaning of the calves is rapidly (today they get milk, tomorrow not), and on the remaining 60% it is done gradually, within a week. The average age of calves at weaning is 13 weeks. Calves are weaned when they reach an average 159 kg and when they are able to eat 550 g of concentrate per day. These parameters indicate that full milk and/or milk replacer probably have a

significant part in the diet, given that the calves in the mentioned period usually have a lower weight (*Romčević et al., 2007; Stojanović et al., 2007*).

Diseases and preventive measures

During the day, the breeders most often monitor the calves for about 15 minutes (37%) or up to 30 minutes (37%), but also between 30 and 60 minutes (13%) or longer than 60 minutes (13%), which is usually enough to notice health problem, if any. However, answers on the prevention, appearance and treatment of some calves diseases (Table 3) indicate that breeders give insufficient attention to the health of calves or they do not know enough of the signs of these diseases or about the consequences to the animal (e.g. the weakening of resistance to other diseases, slower waight gain or death).

Table 3. Calves diseases and their control

Parameter	Answers offered in the questionary	Results (%)
performing disinfection of the navel of a newborn calf	• always • never • occasionally	23 67 10
occurrence of omphalitis (i.e. navel disease)	• never • sometimes	83 17
occurrence of joints swelling	• never • sometimes	83 17
occurrence and treatment of trichophytia (i.e. ringworm)	• never • sometimes, it is treated • sometimes, it is not treated	63 17 20
treatment against parasites*	• yes, against endoparasites • yes, against ectoparasites • no, no problems with parasites in calves • no, although calves have parasites	70 23 20 3

* multiple answers

In raising calves, succes or failure depends to a great extent on the breeder's attitude to the calves and the ability to react promptly to the calves'signals (*Moran, 2002*). The breeders'attitude can best be seen from the following data on diarrhea and respiratory diseases, as the most frequent calf diseases in our study and generally in cattle breeding (*Samolovac, 2016; Fruscalso et al., 2017*).

In the past year, at almost all of the farms (97%) have been cases of diarrhea i.e. stool that is more liquid than normal and lasts longer than two days. Almost a half of calves at the farm gets sick (46%), but less than half of them is treated (41%). This indicates that breeders do not call often a vet for calves that have diarrhea, and reasons for calling can be found in Chart 2.

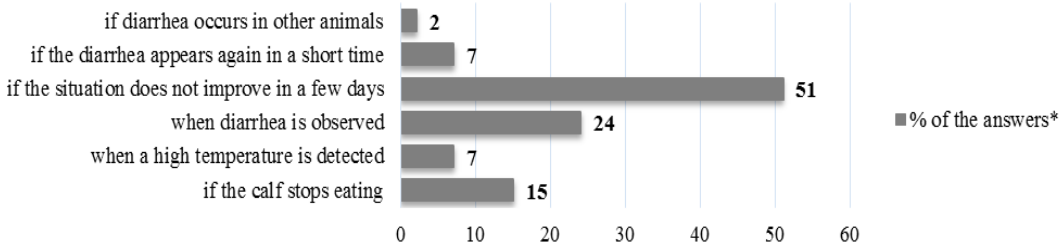

Chart 2. Reasons for calling a veterinarian for calf having diarrhea (*multiple)

Most farmers (52%) measure the temperature of sick calf if they estimate it is necessary due to poor condition of the animal, and 10% do it always (as soon as they notice the signs of illness); 38% breeders never measure the temperature.

Table 4. Procedures regarding nutrition and rehydration of calves with diarrhea

Parameter	Answers offered in the questionary	Results (%)
administration of rehydration fluids	• never • always	65 35
restricticton of milk	• always • never • occasionally	4 55 41
restricted access to water	• calf otherwise has no access to water • no • yes	34 63 3

If a calf with diarrhea can still stand, it should continue to receive sufficient quality of milk and a mixture of electrolytes. In calves that can not stand up electrolyte must be compensated by intravenous infusion (*Smith, 2010*). Another common opinion among breeders is that deprivation of water in the calf with diarrhea can accelerate the healing (*Relić et al., 2017a*). Calves with diarrhea lose large amounts of fluid and electrolytes, with attendant dehydration and acidosis (*Groutides and Michell, 1990*). That is the reason that in calves suffering from diarrhea ad libitum availability of water is strictly required (*Wenge et al., 2014*). In Table 4 is shown that calves of 34% breeders have no permanent access to the

water. It is recommended to give calves access to water directly after birth, what also stimulates food intake and growth (*Martyn, 2017*).

Occurrence of respiratory diseases in the last year has been reported by 33% of the breeders, while the rest did not notice the signs (difficulty breathing, coughing, wheezing and/or discharge from eyes or nose). An average incidence is 26% of calves per farm. Veterinary intervention was necessary for 80% of them. The reasons for calling veterinarian (Chart 3) are in line with determined in study by *Samolovac* (2016).

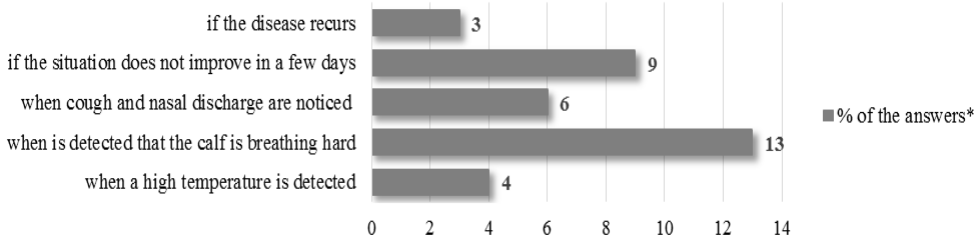

Chart 3. Reasons for calling a veterinarian for calf having respiratory disease (*multiple answers)

On 20% of the farm, the breeder never measures body temperature of the sick calves, and the remaining 80% of the farms it is measured as is needed (according to subjective assessment of the farmer).

In addition to the already mentioned measures that are directly related to the specific disease, as general biosecurity i.e. preventive measures the breeders usually carry out control of flies (35%) and rodents (28%) in the stalls. Some consider that for this purpose it is sufficient to keep only one species of animals in the stall (12%), and the least of them have a disinfection barrier at the entrance of the stall (2%). At 17% of the farms any measure aimed at the prevention of diseases is not implemented.

Successful disease prevention requires the simultaneous, regular and proper application of several hygienic-sanitary and veterinary measures (*Hristov, 2002; Relić, 2014*). According to data in this survey, the breeders implement even less preventive measures than in the similar study by *Relić et al*. (2017). On small farms where different species of animals are present and where traditional methods of breeding are applied, it is very difficult but it is not impossible to implement certain measures, such as isolation of animals and control of movement. Factors that can influence the application of preventive measures on any farm, regardless of its capacity and the species that are breeding, primarily include knowledge, awareness and economic opportunities of the breeder (*Relić, 2014*).

Conclusion

Based on these results, it can be concluded that cattle breeding is the dominant branch of animal husbandry in small rural farms of the Danube Region, with an average of 18 heads of cattle. Rearing technology at these farms is not consistent with the recommendations in many aspects. The main objections are regarding the following: ignorance of the cause of death of calves, high calves' mortality due to accidents, generally unsatisfactory care of newborn calves, practice of calves tethering, hygiene of calf's pen and buckets for milk feeding, quality and temperature control of colostrum/milk, not performing disinfection of new-born calves' navel, insufficient knowledge of signs of illness, delaying or denying veterinary assistance to sick calves, restriction of milk and water to sick calves (as well as limited access to drinking water in general) and insufficient appliance of general preventive measures. All of this could have resulted in a high incidence of diarrhea and high mortality rate due to respiratory diseases, as is found in this study. Corrections in this regard could contribute to better health of calves, and in order to achieve this, better information and a higher motivation of the producer is needed in the first place.

Uslovi gajenja i zdravstveno stanje teladi na malim seoskim farmama

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Rezime

Dobri uslovi gajenja su ključni faktor za očuvanje zdravlja i dobrobit teladi. Kao najčešći zdravstveni problemi teladi obično se navode prolivi, infekcije disajnih puteva i infekcije pupka. Cilj ovog istraživanja bio je sagledavanje uslova gajenja i učestalost pojave najčešćih zdravstvenih problema kod teladi na malim seoskim farmama u Podunavskom regionu Srbije. Podaci su prikupljeni sa 30 farmi anketiranjem farmera. Anketa se sastojala od 75 pitanja koja su se odnosila na: opšte informacije o farmi, teljenje, ishranu teladi, odbijanje, smeštaj, higijenu prostora za smeštaj plotkinja i teladi, bolesti koje se javljaju kod teladi i mere preventive bolesti. Prema odgovorima, prosečan broj goveda svih kategorija na farmama je 18. Telad se na 67% farmi odmah po rođenju odvaja od majki. Dobijaju kolostrum 2 sata po rođenju na 47% farmi, a na 20% farmi odmah po rođenju. Prosečna starost teladi pri odbijanju je 13 nedelja. Telad počinje da koristi

seno obično između 1. i 2. nedelje života, a koncentrat u 2. nedelji. Telad se drže u različitim tipovima bokseva. Farmeri su naveli proliv i respiratorne bolesti kao najčešće zdravstvene probleme kod teladi. Uslovi gajenja na farmama često nisu u skladu sa preporukama i odgajivači ne sprovode sve neophodne preventivne mere za sprečavanje pojave bolesti. Korekcije u ovom pogledu bi mogle doprineti boljem zdravstvenom stanju teladi.

Ključne reči: telad, male farme, uslovi gajenja, zdravstveni problemi

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