Effect of calf management and feeding practices on various diseases at dairy farms

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Abstract

The present study was undertaken to determine the predisposition of one calf disease with another and various calf management and feeding practices predisposing to occurrence of diseases in calves. For this purpose, a total of 420 respondents from six different agro-climatic zones of Punjab were selected purposively and were interviewed personally through a structured interview schedule. Calf scours was negatively correlated ($p<0.01$) with constipation. Pneumonia, joint ill was found to be significant ($p<0.05$) with septicemia, while septicemia was found to be correlated with lumpy skin disease. Lumpy Skin Disease was found to be highly significant with pneumonia and naval ill with joint ill ($p<0.01$). Parasitic infestations were found to be correlated with pot belly ($p< 0.05$). Various calf management practices such as calf assistance, ligation of naval cord, antiseptic used on naval cord, provision of calving pen during parturition and calving pen disinfection, drainage facilities were negatively correlated with naval ill. Similarly, deworming was negatively correlated ($p<0.01$) with pot belly condition while weaning with parasitic diseases and ventilation facilities with pneumonia in calves. Over feeding of colostrum, and feeding of silage at an early age to calves was highly significant with ($p<0.01$) with calf scours. Feeding of milk replacer, addition of yeast and vitamins in diet of calves was negatively correlated with calf scours and feeding of calf starter with pot belly condition in calves. Overfeeding of prebiotics and probiotics may predispose to constipation and septicemia and was found to be significant ($p<0.05$). Addition of prebiotics reduces the incidence of calf scours ($p<0.01$). Thus, it was concluded that presence of one disease can predispose the calves to other diseases as well. Various management and feeding practices also trigger the incidence of calf diseases if not done scientifically. Hence, farmers need to be educated on scientific and healthy calf management through training and other extension and advisory services.

Keywords: Calves; Diseases; Feeding; Management; Predisposition

Introduction

Calf management and feeding practices are crucial components of animal husbandry. However, they are sometimes overlooked because of unawareness among dairy farmers. Calves that are raised effectively have improved growth, health, and production. Scientific calf rearing is critical for preserving and sustaining the dairy industry's genetic diversity as well as deciding the future profitability and sustainability of the dairy industry. It's essential to carefully observe calves feeding and management practices in order to spot any potential diseases/ source of illnesses. The dairy farms are significantly impacted by calf diseases. This financial impact results from the direct costs of calf losses and the expenses associated with treating the calves (Lorenz et al., 2011). Calves disease prevention should be a top concern in all calf rearing operations, and it involves taking precautions to lessen the calf's exposure to infectious agents and increase its resistance to infection. Various diseases of calves particularly calf scours, pneumonia, septicemia, naval ill, joint ill, constipation, pot belly and parasitic infestations have greater impact on survivability of calves if not properly treated (Kumar et al., 2013). It is quite challenging to determine the optimal calf care techniques for calves from birth to weaning and until they become heifers. All facets of calf rearing are essential. Non-adoption of recommended management and feeding practices can predispose calves to other diseases. Since rural farmers have poor knowledge regarding scientific calf management and feeding practices (Kaur & Toor, 2022); so appropriate strategies should be formulated in order to implement a structured calf care management programme in order to minimise the calf mortality losses and other production and reproduction losses that may occur in near future when calf becomes heifer (Islam et al., 2020). It is also important to take care of the factors triggering various calf diseases. The present study was undertaken to investigate the concurrence of calf diseases and to evaluate the effect of calf management and feeding practices on the occurrence of various diseases in dairy calves maintained under field conditions. Therefore, to evaluate the association between calf management practices and the occurrence of various calf diseases extension efforts need to be taken for successful implementing the calf management and feeding programmes for the benefit of farmers.

Materials and Methods

The six different agro-climatic zones (namely ACZ-1, ACZ-2, ACZ-3, ACZ-4, ACZ-5 and ACZ-6) of Punjab that were the subject of the study were namely the sub-mountain undulating area, the undulating plain region, the central plain, the western plain, the western region, and the flood plain region. Small, medium and large dairy farmers were selected from six different agro climatic zones of Punjab for assessing the incidence of disease of calf with one other and impact of various calf management and feeding practices on occurrence of various calf diseases. For this purpose, a systematic structured interview schedule was created and originally pilot-tested on dairy farmers from a non-sampling region. The information gathered from the pre-testing was then used in a subsequent knowledge test. The list of 74 items was administered to 36 randomly selected respondents having calves in the range of 0-6 months of age. The final items chosen were then subjected to item analysis procedure. The difficulty and discrimination index were used in the item analysis. Only 32 items met the requirements for difficulty index between 30 and 90 and discrimination indices between 0.1 and 0.8. All the knowledge items were subjected to reliability. The coefficient of correlation (r) between forms was found to be 0.85 (split half method). Full length reliability (R) was found to be 0.91. Cronbach alpha (α) value was calculated to be 0.88, testifying the internal consistency of the knowledge test. The sample size for the current study was determined by assuming that 50% of the population's individuals have the factor of interest, with a margin of error of 0.5%, an absolute precision of 5.0%, and a 95.0% confidence level. The study required a minimum sample size of 385. However, in order to ensure uniform distribution between the six agro-climatic zones, a total no. of 420 dairy farmers were selected. Dairy farmers were personally contacted, interviewed and surveyed in order to avoid the influence of other farmers. About 70 dairy farmers were selected from each agro-climatic zone. From each zone two districts were selected purposively and villages were further selected randomly. From each district 35 dairy farmers were selected randomly. The data was further compiled, tabulated and analyzed using statistical tools like Microsoft Excel and SPSS 20.0.

Results and Discussion

Correlation of one disease with the other

In calves, the occurrence of one disease might trigger the occurrence of another. The Table 1 shows the relationship between the calf diseases with one another. From Punjab's six main agro-climatic zones, a total of 420 farmers were surveyed regarding the occurrence of diseases in their calves and were subjected to correlation. Calf scour is negatively correlated with constipation, as can be observed in Table 1. It means that the incidence of constipation is quite low when calf scour is present. Pneumonia and lumpy skin condition were revealed to be highly significant ($p<0.01$) together. In Lumpy Skin Disease, calf pneumonia may be a risk factor. Joint illness and naval illness were found to be significantly connected with septicemia ($p<0.01$) and highly correlated ($p<0.01$) with each other.

Calves are more likely to contract septicemia, calf scours and pneumonia if their colostrum intake or absorption is inadequate. If left untreated, naval ill may spread through the circulation and localise in the joints, causing joint disease that increases the risk of septicemia in calves (Rajdurai et al., 2020). Blood, nasal secretions, lachrymal secretions, animal feeding, and water troughs are all ways that the LSD virus can spread to other animals, causing septicemia and fever (Magori-Cohen et al., 2012). Susceptibility of Lumpy Skin Disease is more in calves (Gupta et al., 2020). As a result of the animal inhaling the necrotic debris, pneumonia can also result from Lumpy Skin Disease (Al-Salihi, 2014). The calves' ability to digest and assimilate their feed may be hampered by both internal and external parasite infestation, which can result in a weakened immune system. It might also make the calves more susceptible to pot belly disease.

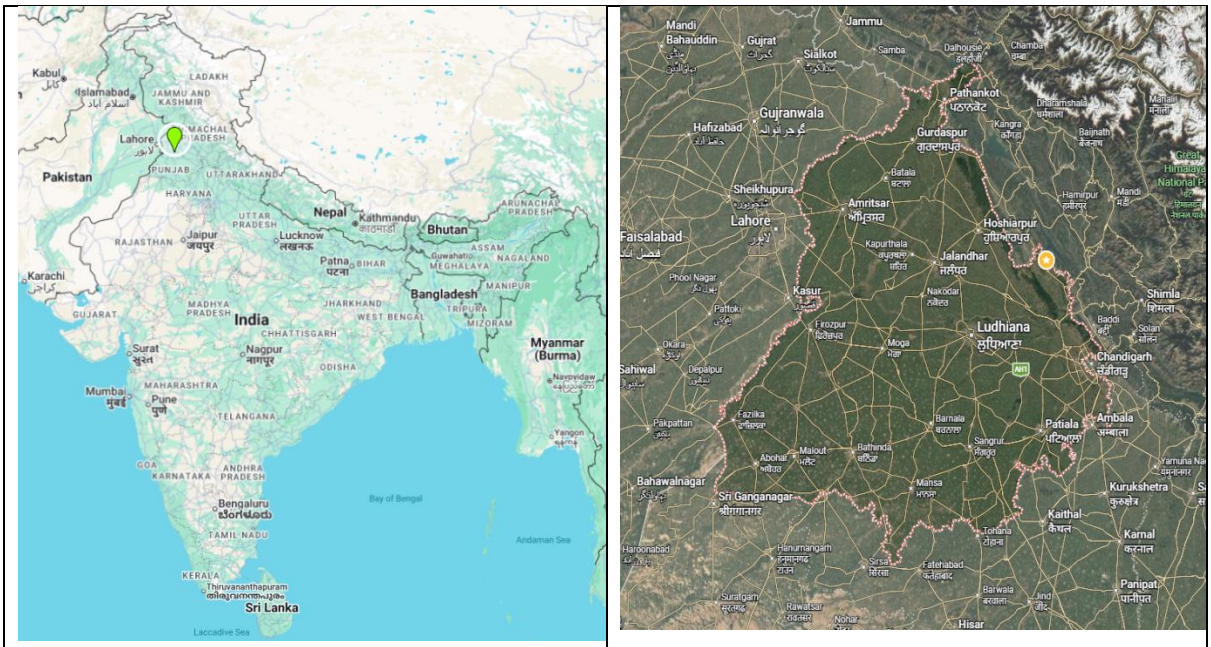

Figure 1: Geographical map of area under study (Punjab, Green Map Pin (Left image) and Red Dotted area (Right image); Source (Google Maps).

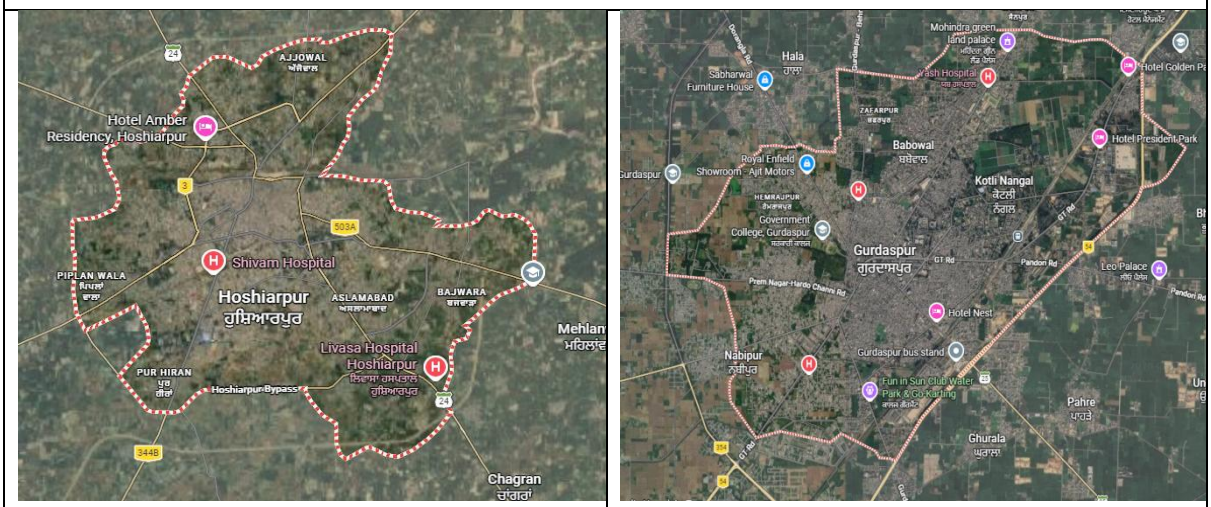

Figure 2: Geographical map of different districts of six agro climatic zones of Punjab under study; Source (Google Maps).

Table 1: Correlation of one disease with other (n=420)

One Disease	Other Disease	Correlation Coefficient
Calf scour	Constipation	-0.37*
Pneumonia	Septicemia	0.09
LSD	Pneumonia	0.17*
Naval ill	Joint ill	0.15*
Joint ill	Septicemia	0.10
Septicemia	LSD	0.12
Parasitic infestation	Pot belly	0.11

* Significant ($p<0.01$)

Table 2: Correlation of calf management practices with incidence/occurrence of diseases in calves (n=420)

Parameter	Disease	Correlation Coefficient
Calf assistance	Naval ill	-0.21*
Ligation of naval cord	Naval ill	-0.11
Antiseptic used on naval cord	Naval ill	-0.23*
Provision of calving pen during parturition	Naval ill	-0.11
Calving pen disinfection	Naval ill	-0.18*
Deworming	Pot belly	-0.44*
Weaning	Calf scour	0.14*
	Pneumonia	0.10
	Parasitic infestation	-0.15*
Drainage facilities	Naval ill	-0.08
Ventilation facilities	Pneumonia	-0.08

*** Significant ($p<0.01$)**

Correlation of calf management practices with incidence of other diseases

Table 2 shows various calf management techniques practiced by all dairy farmers in Punjab's six agro-climatic zones and how they were related to various calf diseases that the calves of the dairy farmers' contracted. It was found that calf assistance ($p<0.01$), antiseptic application to the naval cord ($p<0.01$) and disinfection of the calving pen prior to and during parturition ($p<0.01$) were negatively connected with the occurrence of naval ill. It suggests that the likelihood of developing naval ill was lower in situations when calves received the required care and help during parturition, and the calving pen was adequately cleaned and disinfected. The incidence of naval illness in calf increases when hygiene practices in dairy shed decrease. Deworming was also discovered to be inversely linked with potbelly, indicating that deworming decreased the prevalence of pot belly in calves. Calves with internal parasites experience diarrhoea, reduced growth, rough skin, and a pot belly condition. Weaning was also found to be significant ($p<0.01$) with calf scours, according to Table 2. Internal parasites in calves causes diarrhoea, stunted growth, rough skin and a pot belly condition in calves. Table 2 also indicates that weaning was highly significant ($p<0.01$) with calf scours. If weaning is not carried out properly and sufficient care is not given to calves during the weaning stage, this may cause stress in calves, which further increases their risk of developing specific health issues such calf scours/diarrhoea and pneumonia. However, weaning was negatively correlated with parasitic infestation ($p<0.01$). This is due to the fact that calves initially pick up external parasites from the dams. With weaning, there is a greater possibility of their drifting away from the dam and fewer odds of external parasite infestation. Naval ill was inversely connected with adequate drainage facilities. Naval illness was less common in calf enclosures with proper hygiene standards. Ventilation was discovered to have a bad correlation with pneumonia, nevertheless. Different respiratory illnesses including pneumonia are less common when there is adequate airflow and ventilation.

Correlation of calf feeding practices with incidence of diseases in calves

The relationship between calf feeding practises and the prevalence of diseases in calves is shown in Table 3. Colostrum feeding, among other calf feeding practises, was found to have a highly significant ($p<0.01$) negative correlation with pot belly in calves. This indicates that calves given colostrum in the proper quantity and frequency have strong defences and have very little likelihood of developing ailments like calf scour and pot belly (Mengesha et al., 2013). Feeding of milk replacer according to appropriate dose and body weight does not cause calf scours. Pot belly, however, was negatively correlated with feeding calf starter. It implies that feeding calf starter promotes the growth and development of calves and prevents pot bellies (Stamey et al., 2012). It was discovered that the amount of calf starter was negatively correlated with septicemia ($p<0.01$). It was discovered that feeding silage to calves increased the risk of calf scour and that this relationship was found to be highly significant ($p<0.01$). Silage feeding at early stage of calves makes them more susceptible to developing diarrhoea or calf scours. Kehoe et al. (2019) examined the consequences of feeding calves only maize silage as starter feed, and discovered that this slowed the growth of the rumen papillae and tended to damage

intestinal morphology. Young calf scours had a negative correlation with feeding yeast to calves. It indicates there were fewer cases of calf scour in areas where yeast was added to the calves' diet. Calf ailments like calf scours were less common when vitamins were added to the calves' diet. Probiotics and prebiotics were found to be very helpful for treating septicemia and constipation. However, addition of prebiotics was highly significant ($p<0.01$) and negatively correlated with calf scours. Where prebiotics were added, calf scours incidence was reduced (Soto et al., 2011). But overdosing on probiotics and prebiotics can make diseases like constipation and septicemia worse. The dairy farmers may not have recognised the proper probiotic and prebiotic dosage to administer to calves, which could account for this.

Table 3: Correlation of calf feeding practices with incidence of calf diseases

Parameter(n=420)	Disease	Correlation Coefficient
Colostrum feeding	Calf scour	0.09
	Pot belly	-0.14*
Milk Replacer	Calf scour	-0.10
Calf starter	Pot belly	-0.14*
Quantity of Milk replacer	Calf scour	0.12
	Pneumonia	-0.10
	Septicemia	-0.34*
Quantity of Calf starter	Septicemia	-0.17*
	Pot belly	0.10
Silage feeding	Calf scour	0.26*
Yeast	Calf scour	-0.08
Vitamins	Calf scour	-0.09
	Parasitic infestation	0.12
Probiotics	Constipation	0.10
	Septicemia	0.09
Prebiotics	Calf scour	-0.13*
	Constipation	0.09
	Septicemia	0.11

* Significant ($p<0.01$)

Conclusion

Calf management is crucial for future productivity of dairy herd. Dairy farmers should be made aware of various calf diseases, various factors predisposing one calf disease on other and economic loss caused due calf diseases in near future. Therefore, the farmers need to be supported with appropriate extension and advisory service to overcome knowledge and skill-gap in calf feeding and management with an emphasis on factors triggering one calf disease on the other. As a way forward, training encompassing calf health management and feeding must be included for disseminating the needy information among the farmers in areas of scientific calf rearing.

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