

# A survey of pre-weaning calves practice in smallholder dairy farms in Indonesia

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**Submission date:** 05-May-2023 09:54PM (UTC+0700)

**Submission ID:** 2085144177

**File name:** ning\_calves\_practice\_in\_smallholder\_dairy\_farms\_in\_Indonesia.pdf (156.93K)

**Word count:** 3810

**Character count:** 19359

## A survey of pre-weaning calves practice in smallholder dairy farms in Indonesia

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### Abstract

Increasing concern in pre-weaning calves not only related to animal welfare but also an effort to increase the health risk of calves and hopefully resulting lower mortality rate. A survey on dairy calf welfare was performed using a farmer questionnaire. The survey included 100 smallholder dairy farmer that own 2-10 dairy cows with 282 calves birth during observation, farms were selected randomly and regularly monitored for clinical health problems from neonatal up to three months of age.

The survey revealed that (1) 86 % farmer separated calves within 24 hours after birth and gave colostrum in the first six hours, then later placed calves in individual wood crate in 90% farms, 6% in concrete floor, and 4% in soil floor (2) Only in one farm, calf obtain colostrum by suckling; in one farm use a teat bucket, and in 98 farms calves drinking from a simple bucket (3) In 50 farms, calves was fed colostrum 2 l/day and in 39 farms received between 1-2 l/d, and there were 1 farms gave less than 1 l/d. More than half of calves (55%) were delivered by assistance and there were 8% perinatal death. The survey also showed that the morbidity rate of calves on smallholder dairy farm was high, there were 108 calves (30.8%) suffer during the study with diarrhea (55.046%) and bloat (41.284%) as the most frequent syndromes. The other disease conditions diagnosed include pneumonia and navel ill cases. The highest of crude morbidity was observed in calves at age 8-30 days (37%) and 1-3 month (47%). Besides died in delivery (24 calves), bloat and diarrhea symptoms were also the main causes of calves' death (31% and 27% respectively). Highest risk of mortality was observed in calves at 8-30 days then followed by 1-3 months old. Dietary adjustment at that two critical time (from just fresh milk to another feed) at day 8, and from only liquid to solid feed after calves reach a month was suggested as the most potential risk.

**Keywords:** *colostrum, diarrhea, house, morbidity, mortality*

### Introduction

Ensuring proper calving management, strategic navel antisepsis, prompt movement of the newborn calf to hygienic calf housing (Mee 2008), and efficient colostrum management (Godden 2008) are the key features of successful newborn dairy calf management. Unfortunately young animals are the most neglected class of stock on most small holder dairy farms, primarily because it has the greatest time span between any financial investments and return (Tiwari et al 2007; Moran 2009). In addition, the first 3 months or pre-weaning period are the most expensive period in the life of any dairy cow and many farmers are just not prepared to invest in the calves' future. So it is not surprising that pre-weaning calf's mortality rate in small dairy farming particularly in tropical are high. The mortality rate of calves in small dairy farmer could reach 22% in Ethiopia (Wudu et al 2008), and 68.8% in India (Tiwari et al 2007) even in the modern dairy farm, calf loss rates are rising in many countries internationally (Mee 2013). There has no official data from pre-weaning calves losses in Indonesia, the identification of symptoms of morbidity and mortality in this study was expected to be used as used for prevent, treatment, and improvement of rearing system, thereby reducing calf morbidity and mortality rate.

### Materials and methods

#### Study area and population

The study was conducted from April, 2013 to December, 2013 in Pujon, 4.5 km west of Malang. The area has an altitude of 1100 m and enjoys an average annual rainfall of 2310 mm. The average maximum and minimum temperature of the area are 26°C and 19°C, respectively (National Meteorological Service Agency 2000). In the study area, there were more than 614 smallholder dairy farms with an average herd size of around four lactating cows. The majority of dairy farms were organized under one dairy cooperative called KOPSAE Pujon. All farms were keeping Holstein-Friesian. A simple random sample of 100 farmers were selected from a list. In this study, calf morbidity is defined as any sickness that has a recognizable clinical manifestation, and mortality as death of calves. Morbidity and mortality data were collected through questionnaire survey and by monitoring dairy farms for during the study.

**Table 1.** Studied parameters of pre-weaning calf management

Area of Management	Parameters
Newborn calves	Delivery status, time of separating the calf from the mother
Calf Housing	Kind of individual housing: period, type, materials, floor and bedding
Colostrum management	Time of first colostrum, amount of colostrum, of colostrum period
Calf feeding	Milk feeding plan: quantity, duration, kind of feed: milk replacer, concentrate, hay and water: age at access
Morbidity and mortality	Symptoms, number, age of calves

## Result and Discussion

### New Born Calves Management

In smallholder dairy farming in Indonesia it is a common to separate cows and calves as soon after birth then artificially rearing through simple open buckets, although this system is not considered as the best option for small-scale farmer (Mai Van Sanh et al 1997). The surveyed farmer carry out the practice due to economic reason, but some research showed that restricted suckling have more benefit than artificial rearing for dairy farm sustainability.

While Alderete et al (1998) found that calf suckling indeed delay the expression of estrus, Mai Van Sanh et al (1997), Mejia et al (1998) and Junqueira et al (2005) found it otherwise. Restricted suckling also gave better calves' average daily weight and milk conversion, increase total milk yield and saleable milk and decreasing mastitis (Khan and Preston 1992; Mai Van Sanh et al 1995; Mai Van Sanh et al 1997; Mejia et al 1998). Furthermore, stimulus of the calf proved to be more economical than artificial rearing, as more milk and equal calf live weights were obtained without extra labor involvement (Junqueira 2005).

In 86 of the farms surveyed, calves were separated from the cow before 12 hours after birth, meanwhile on other 14 farms calves were stay at least 24 hour with the cow. Besides economic reason and academic explanation, it seems that hereditary habit and beliefs that cows will more difficult to be handled is behind the decision to practice artificial rearing.

### Calf Housing

One of consequences of immediate separation was providing proper house for calf, house that should be well designed, maintained and operated to ensure a high level of animal welfare, minimal stress or chance of injury (Moran 2009). The housing condition greatly on calf's health (Tiware et al 2007; Wudu et al 2008), more over Matondi et al (2014) concluded that along with adequate access to colostrum calf comfort is important to ensure the calf's health.

In surveyed farms, all farmers used individual house; 90% in wood crate, 6% in house with concrete floor, and 4% in soil floor. A major advantage from individual house is reducing transmission of diseases. Matondi et al (2014) found that calf mortality were higher in group rearing than in individually house (58.3 % and 33% respectively) and calves' survival rate from individual house was 46.1% while it was only 19% for group rearing.

Despite of the selection of individual pen in this survey seem based on the calves number owned rather than another reason, farmer should give more attention in cage cleanliness.

### Feed management

The timing of the first meal of colostrum is critical because optimal absorption of immunoglobulin occurs

before 4 h of age and decreases rapidly after 12 h (Weaver et al 2000). The physiology of the bovine placenta prevents transfer of maternal serum immunoglobulin to the calf before it is born, the neonatal calf is entirely dependent on colostrum immunoglobulin for protection from disease. In survey, most farmer (86%) gave first colostrum in the first 6 hours and the rest gave after 6 until 12 hours after birth. For each hour delay in colostrum feeding in the first 12 h of life, the chance of a calf becoming ill increases by 10% (Moran 2011).

The method of colostrum feeding can have an effect on calf welfare. According to Mai Van Sanh et al (1995), suckling naturally will let milk directly flow to abomasum, the true stomach of a newborn calf. So both the energy and protein are utilized with considerably greater efficiency than if the milk had first passed into the rumen which probably occur in bucket feeding method.

Feeding calf with open bucket is the most common practice in small dairy farmer in Indonesia. Almost all (98%) farmers gave colostrum by a simple bucket, only 1 farmer gave by teat bucket and another 1 farmer left calves for suckling. This system was supposed to assured calf receiving amount of colostrum, but according to Ryle and Orskov (1990) milk antibodies and cells possibly attach to the surface of bucket so less are available for the calf. In addition, preparing the temperature of bucket-fed milk could lead increase risk of infection.

According Moran (2009) rubber teats give no additional nutritional benefit over simple bucket feeding because the speed of drinking milk has little effect on its utilization. However, the production of saliva is greater in teat-fed calves and it may help maintain fluid intake in scouring calves.

Farmers surveyed still had difficulties for accepting negative implications of suckling systems especially decreasing of marketable milk. Applying restricted suckling that was done in small holder dairy farm in some countries like Pakistan (Khan and Preston 1992), Tanzania (Mai Van Sanh et al 1995; Mejia et al 1998), and Vietnam (Mai Van Sanh et al 1997) may be a compromise for farmer to get healthier calves without significant loss of saleable milk.

In 50 farms, calves was fed colostrum more than 2 l/day, in 39 farms received between 1-2l/d, and 11 were 11% farms gave colostrum less than 1 l/d. For Holstein calves, Weaver et al (2000) concluded that to ensure sufficient absorption of immunoglobulin (100 mg) and subsequently reduce the risk of mortality, calves should considered a minimum quantity of 4 l of colostrum. The amount of colostrum intake after birth will influence the insulin-like growth factor I (IGFI) for neonatal calf, although colostrum IGF-I is barely absorbed (Hammon et al 2000).

Most surveyed farmer had given colostrum at recommended time, but mode of administration, bucket cleanliness, and amount of colostrum still need an improvement.

Liquid fed continue, where as 43% farmers gave less than 4 l/day and 57% gave more than 4 l/d. Milk replacer (MR), concentrate, and grass were introduced to calves in different age, in survey, 1 farmer introduced in less than a week old, 43% started in less than 3 weeks, and 56% in age more than 3 weeks. The various result also showed in weaning time, 21 farmers weaned calves in 1-3 month and 79 farmers weaned in more than 3 month old.

**Table 2.** Calves Morbidity and Mortality in Different Age

Age	Number of Calves		Death: Illness
	Illness	Death	
< 1 week	13	9	69%
8 – 30 d	41	24	59%
1-3 month	50	18	36%
> 3 month	4	10	250%
Total	108	61	

### Calf Morbidity and Mortality

Mee (2008) defined perinatal mortality as fetal death prior to, during, or within 48 hours of calving, following a gestation period of at least 260 days, irrespective of the cause of death or the circumstances related to calving. From 282 calves birth during the survey, 155 (55.11%) were delivered by assistance, 103 calves (36.44%) delivered unassisted, and 24 (8.44%) die during or shortly after birth. This perinatal mortality is much higher than found in Pakistan: 3.5% (Lari 2007) According to Berger et al (1992) perinatal calf mortality could be divided into mortality associated with dystocia and mortality occurred in deliveries normal. High perinatal mortality in the research could be associated with large calf at birth. All surveyed farmers use semen for artificial insemination breeding from the same place: Balai Inseminasi Buatan (Center for Artificial Insemination) Singosari. All semen came from large weight bull, so tend to produce large calf.



Larger and heavier calf at birth, suffer more difficult calving and consequently are at greater risk of perinatal mortality can occur with introduction of particular Holstein sires' genes into indigenous cattle populations (Steinbock et al 2003).

From 258 survived calves, there were 108 calves showed various illness symptoms during 0-90 days. Bull and heifer calves had the same opportunity to the exposure. Somewhat unpredictable, highest morbidity was observed in calves at age 1-3 month (47%) followed by 8-30 days (37%) and, not in calves earlier age (< 1 week). But if related to mortality rate, it showed that the younger calves had higher risk to fatal. With increasing age there is a potential increase in the immunity of calves as a result of which they get better equipped to defend themselves against a wide variety of infections, except again unpredictable death of calves after 3 months old.

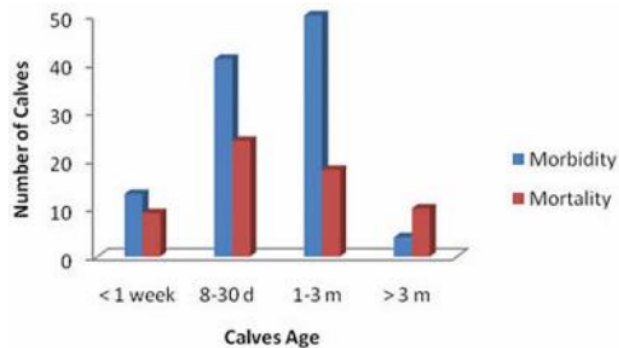


Figure 1. Calves Morbidity and Mortality in Different Age

Most farmer (79) weaned calves after 3 month old, unpredictable path in this age showed that weaning is very stressful on calf. According Baldwin et al (2004) transition from "pseudo-monogastric" digestion to ruminant digestion is a delicate process for the young calf, and mechanisms controlling ruminal differentiation are not entirely understood. Farmers should give more attention in weaning system, lost calf at this age is a very significant loss. Chang'a et al ((2011) stated that besides diseases, improving feed quality especially in pre-weaning and weaning periods should be more considered.

Diarrhea (55.046%) and bloat (41.284%) were the most frequent syndromes followed by other conditions diagnosed include pneumonia and navel ill. Besides died in delivery (24 calves), bloat and diarrhea were also the main causes of calves' death (31% and 27% respectively). Farmers seem can more handle diarrhea than another illness, from 60 cases, 75% could be handled and not causing death meanwhile from 45 bloat cases only 14 calves were survived. The common element found throughout all cases of bloat is microbial fermentation of energy sources resulting in the production of gas that is unable to escape. Ruminal and abomasal bloat occurred only in bucket-fed calves (Everitt and Evans 1970 in Ryle and Orskov 1990), and often rapidly progressive and life threatening (Costelo 2005), Pneumonia and navel ill even though appeared in small number but fatal, all followed by calf's death.

Table 3. Morbidity and Mortality Symptoms

Symptoms	Number of Calves		Death: Illness
	Illness	Death	
Bloat	45	31	69%
Diarrhea	60	27	45%
Pneumonia	2	2	100%
Navel Ill	1	1	100%
Total	108	61	

Calf diarrhea, particularly in pre-weaning calves is one of the most important problems in calf rearing on dairy farms in Indonesia, in line with Razzaque et al (2010) and Matondi et al (2014) studies. Diarrhea in this age could be caused by pathogens, non-infectious management factors, especially management around birth, colostrum management, calf housing, feeding, and hygiene. Artificial rearing that practiced by Indonesian farmer likely contribute to the high morbidity and mortality rate. The mortality rate was higher in bucket-fed calves than those suckled. (Preston 1973 in Ryle and Orskov 1990; Ugarte 1992 in Junqueira et al 2005)

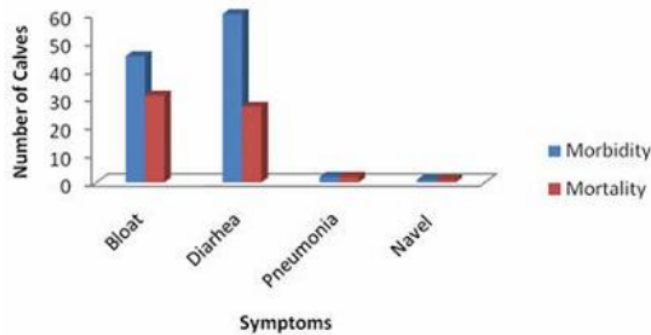


Figure 2. Calves Morbidity and Mortality with Different Symptoms

## Conclusions

- The study showed that feed adjusting period is critical time for calves, so that small dairy farm in Indonesia should give more attention in feeding system in pre-weaning calves.

## Acknowledgements

This research was part of field study as one of basis data for doctoral program research in Animal Science Program Post Graduate School of University of Diponegoro, Semarang with support from Higher Directorate General of Higher Education, National Education Ministry of Indonesia. We would like to thank all farmers for their permission to work with their cattle and their participation in the study. The authors also acknowledge support for this research from Mr. Ali Mahmud and KOPSAE Pujon staff who provided valuable help in the field work.

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*Received 5 February 2015; Accepted 28 March 2015; Published 1 May 2015*

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