MANAGEMENT OF BEEF CATTLE REARING IN THAI SAREE FARM, KHONG KLUNG DISTRICT, KAMPHAENG PHET PROVINCE, THAILAND

Internship Report

By:

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ANIMAL SCIENCE PROGRAM
FACULTY OF ANIMAL SCIENCE
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This internship is a partial of the requirements to obtain a Bachelor Degree at Faculty of Animal Science, University of Brawijaya.

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ABSTRACT

The internship was held from 1st November – 2nd December 2018 in Thai Saree Farm, Khong Klung District, Kamphaeng Phet Province, Thailand. The objective of this internship is to get knowledge and field experience related to rearing management of big scale beef cattle farm that is oriented on cow-calf operation to improve beef cattle population growth. The internship was participated directly or indirectly in all Thai Saree Farm activities. The observations which collected are about rearing management including, feeding, housing, handling, reproduction, calf management, medication and vaccination, and Waste management. The observation during the internship was used to collect primary data based on recording, information, and fact in the farm. The observation data and facts are compared with the literature. The farm gave knowledge and field experience related to beef cattle farm rearing management. The writers suggest that the monitor result should be kept in a computer software instead of in a book for efficiency.

Keywords: beef cattle, cow-calf operation, rearing management

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SUMMARY

The internship was held from 1st November – 2nd December 2018 in Thai Saree Farm, Khong Klung District, Kamphaeng Phet Province, Thailand. The objective of this internship is to get knowledge and field experience related to rearing management of big scale beef cattle farm that is oriented on cow-calf operation to improve beef cattle population growth. The observed materials are American Brahman, Beefmaster, and Charolais cattle. The observations which collected include farm management, feeding, housing, handling, reproduction, calf management, medication and vaccination, and etc.

The daily activities in the farm are releasing the cattle and moving the cattle into the grazing area, bring back the cattle to their shed and close the shed with mosquito net, handle the cattle into the grazing area, handle the calves to milk with their mothers in the morning, clean the cage, maintain the grazing area (Harvesting the pangola grass from the fodder, Burning the grazing area to regrow the pangola grass every 6 months and The area that are burned specific for the dry grazing area, and watering the pangola grass in the pasture area), handle the cattle into the monitoring area, pregnancy checking, health checking, artificial insemination, medicine and vaccination injection to the cattle, maintaining the sick cattle, and The area that are burned specific for the dry grazing area.

The result from the internship is shown that there are three cattle breeds in the farm which are American Brahman, Beefmaster, and Charolais. Each breed has different numbers reared in the farm, which the American Brahman has the biggest number followed by Charolais and then Beefmaster. There are two types of feed used in Thai Saree Farm, which are from forages and concentrate. The forages used in the farm are pangola grass, and hay while the concentrate feed used are cassava and mixed feed (consist of corn and sunflower meal). Urea Molasses Block (UMB) is used as a supplement feed. There are some housing in Thai Saree Farm, which are housing for calves, housing for the grazing cattle, housing for feedlot, and housing for pregnant cow, with the total of housing are

27 units, 7 units for pregnant cow, 4 units for grazing cattle, 15 units for feedlot cattle, and 1 unit housing for calves. The handling done in the farm is dehorning the young bull. For the reproduction activities consist of cattle mating (by using AI or by naturally) and pregnancy recording. The medicine and vaccination were injected to the cattle in the monitoring area which have a benefit to prevent the cattle from sickness and disease. The calves were handled by helping them to milk with their mother.

PREFACE

We would like to give our thanks to the almighty God who with his power, the author can complete the internship program and write this report. The authors would like to thank Thai Saree Farm for providing the opportunity to learn about beef cattle management in Thailand. This practical internship report is one of the requirements for completing the internship report exam at the Faculty of Animal Science, University of Brawijaya. For this opportunity, the author would like to thank:

1. Prof. Dr. Sc. Agr. Ir. Suyadi, MS., IPU., ASEAN. Eng. as the Dean of the Faculty of Animal Science, University of Brawijaya.
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7. Sittipong Kitchpakorn as the business Owner of Thai Saree Farm who has given us the place to learn and practice in the farm.
8. Nittaya Klai Kham as the Manager of Thai Saree Farm who has given a lesson and taught us how to manage the farm well.
9. Our family who always give us blessings to finish this practical internship report.

The composition of this internship report has been made as well as possible, but of course, there are still many shortcomings in writing this report, therefore constructive suggestions and criticism will greatly help the author to improve this report. Hopefully, this report can be useful for students of the Faculty of Animal Science, University of Brawijaya and gives insight to other readers.

Malang, 24th January 2021

Authors

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CHAPTER I
INTRODUCTION

1.1 Background

Indonesia is a tropical country with a large area and rich in fauna and other biological diversity. In terms of livestock, Indonesia has a wide variety of cattle and for example, are the Madura and Bali cattle. Beef cattle farming is one of the ideal businesses that can be implemented in Indonesia due to its potential to fulfill the country's needs. Wahyuni (2015) stated that beef cattle is a commodity in the livestock sub-sector that is able to produce meat, employment and income for farmers. As one of the populous countries, Indonesia is a large market that demands livestock products, especially beef. According to Anonymous (2010) in Atmakusuma et al. (2014), the increasing demand for beef in Indonesia is higher as compared to the capacity of the country to produce hence, 35% of the national demand for beef has to be imported. Because 35% of the demand for beef in Indonesia is still raising beef cattle, it is a suitable business for Indonesia because of Indonesia's need for beef. Animal management knowledge obtained from Thai Saree Farm can teach us how to create a system that will help the effectiveness of the farm to provide good quality livestock and increase the livestock population by providing good maintenance management for these animals from a beef cattle business perspective on a large scale. This indicates the available space for beef cattle farming to be developed.

Indonesia still has many problems in beef farming especially at population growth that leads to insufficient cattle populations. Most of the cattle breeders, however, perform low-input and low-output production systems which resulted in low beef cattle reproduction rates (Ali and Tri, 2018). In line to this, Moss, et al. (2016) mentioned that the low nationwide beef cattle production in Indonesia is because of low reproductive rate due to low fertility as indicated by low conception rates (56%), long calving interval (18 to 21 months), high calf mortality (5% to 10%) and low body condition score. These resulted in slow growth of the national herd. In addition, small scale farmers usually sell productive female cattle to be slaughtered despite government regulation against the slaughter of productive female cattle. This has further slackened the growth of Indonesia's beef cattle herd.

Writers are interested to study rearing management in the big scale beef cattle farm that is oriented on a cow-calf operation in response to problems on insufficient cattle populations in Indonesia. On studying the rearing management of the beef cattle industry, we can find the answer on how to manage beef cattle rearing on a big scale farm to perform high-input and high-output production systems to improve beef cattle population growth.

Like Indonesia, Thailand is also a tropical country and one of the four populous countries in ASEAN with great potential in the beef cattle industry. Thai Saree Farm, for example, is a leading private beef cattle farm that is oriented on a cow-calf operation and not into genetic improvement. It has been developing in Kamphaeng Phet Province since founded in 1991. In 2018, it holds a total of ± 1000 hectares of land with 25 grazing areas including ± 800 hectares, and a total of ± 400 cattle were reared including the Brahman, Beefmaster, and Charolais.

By studying management of the beef cattle breeding industry in Thai Saree Farm, we hope to gain new knowledge related to rearing management as the main activity in a cow-calf farm.

1.2 Problem identification

Based on the background above, the problem in this internship report is how to manage beef cattle rearing on a big scale farm that is oriented on a cow-calf operation to improve population growth based on Thai Saree Farm management practice.

1.3 Purposes

The purpose of this internship is to answer our curiosity on how to manage beef cattle rearing on a big scale farm that is oriented on a cow-calf operation to improve population growth based on Thai Saree Farm management practice and to get knowledge and field experience related to rearing management of a big scale beef cattle farm.

1.4 Benefits

The internship in Thai Saree Farm will hopefully give some benefits as the following:

- To gain more insight to the participants in the rearing management of a big scale beef cattle farm that is oriented on a cow-calf operation to improve population growth.
- To get knowledge and field experience related to rearing management of a big scale beef cattle farm that is oriented on a cow-calf operation.

CHAPTER II
LITERATURE REVIEW

2.1 Beef Cattle Rearing Management

Traditionally, rearing of beef cattle has been cooperative with rice field activity, but a doubling of cropping for rice production has reduced the grazing area available for cattle. A lack of natural grasslands limits large-scale beef production in Thailand. Various attempts have been made to create pastoral lands for cattle, and recently many of these grazing systems have been leased for beef cattle production, especially for cow-calf production (Bunmee et al., 2018).

Calves are raised and kept for various reasons. They may be kept for sale as a young animal at about 1 to 1.5 years of age, or enter a fattening system. The average income from cattle can be divided into two sections: the 1 to 1.5 year-old calf; and male cattle reared for 3 to 4 years. Cows in cow-calf systems have their first calf at around 30 to 40 month of age on average. The price of cattle depends on the breed and live weight. Reproduction is the most important factor in determining profitability in a cow-calf system. To maintain a calving interval of 365 day, a cow must rebreed within 80 to 85 days after calving (Bunmee et al., 2018).

(Bunmee et al., 2018) Continue saying that there is little incentive for the development of commercial beef farms because of scarcity of land and the high levels of investment required. Achmad et al. (2013), suggested the need for government intervention to develop and expand beef cattle programs through incentives and policy support.

2.2 Kinds of Beef Cattle

a. Beefmaster

The Beefmaster is estimated to be slightly less than 50% Brahman, with the balance about equally divided between Hereford and Shorthorn blood (Lal, 2009). The body doesn’t have a special color and it has a big, deep, and long body. It has horns, fast growing, and the carcass quality is great. It has a good ability to adapt to any climate (Susilorini et al., 2008).

b. Brahman Cross

Most cattle in Thailand are still the indigenous breed even though Brahman crossbreds can be found in many areas due to the introduction of Brahman bulls into villages by the Department of Livestock Development during the last 2-3 decades (Chantalakhana, 1984). To improve beef production and to satisfy demand in Thailand, farming has to produce beef of high quality. To achieve this, more information on the quality of beef especially from Brahman and Charolais crosses, widely used for fattening in Thailand (Boonmee et al., 2008 inside Waritthitham et al., 2010). European crossbred steers such as Charolais, Limousin are fattened for 10-14 months and reached 550-600 kg BW (Sethakul et al., 2008).

c. Charolais

Charolais is the most common beef breed used for terminal crossing with *Bos indicus* such as Thai native breed and Brahman for commercial beef production in Thailand (Bureau of Biotechnology in Livestock Production, 2018 inside Thiwaratkoon et al., 2018). Charolais sires used in beef production in Thailand have been imported both in the forms of frozen semen and live animals. Regarding Charolais sires have influence on growth performance of their crosses (Thiwaratkoon et al., 2018).

2.3 Feed

a. Pangola Grass

Pangola grass, *Digitaria decumbens* Stent, is a major grass for cow feeding, and may be a good substrate for protein enrichment (Hu et al., 2012). Common names for pangola are pangola grass (American and Australian English and Thai), finger grass, digit grass, woolly finger grass (English), digitaria (French), pangola grass (German), pasto pangola (Spanish), pangola digit grass (Florida). Pangola is a stoloniferous perennial and when established, it spreads rapidly by stolons. It doesn't produce viable seeds. Stems are up to 120 cm high (Tikam et al., 2013). Pangola is recommended for the poorly drained soils in Malaysia and the Phillipines and is tolerant of flooding (Hacker, 1992 inside Tikam et al., 2013). Pangola grass cultivation has now been introduced into all regions in Thailand. Farmers are now planting and using pangola widely as a crop for raising animals (Tikam et al., 2013). Pangola grass is a good source of forage and can be fed by fresh, hay or silage format. In proper environments, pangola grass can support better ruminant performance in terms of milk yield and composition, body weight gain, feed conversion ratio and meat quality (Hsieh et al., 2017). Crude protein (CP) values of pangola grass are commonly in the range of 5 to 12% of dry matter (DM) but may exceed 15% of DM with young regrowth age and intensive fertilization (Heuzé et al., 2011 inside Tikam et al. 2013). The average CP content of pangola (7,9 %) is low compared to those of *Pennisetum purpureum cv. Mott, P. purpureum, Brachiaria humidicola and Panicum maximum cv. Common* (Animal Nutrition Division, 2004 inside Tikam et al., 2013).

b. Cassava

Cassava (*Manihot esculenta*, Crantz) is vastly planted in tropical countries, particularly in Thailand. Cassava meal contains high levels of readily soluble carbohydrates, but low N content and is highly degradable in the rumen compared with other energy sources (Jetana et al., 2015). Cassava chip can be used as an energy source in the concentrate at 2% of body weight (BW) (80% of cassava chip in the concentrate) and improved rumen fermentation efficiency in cattle fed urea treated rice straw (Khampa and Wanapat, 2006 inside Thang et al., 2010).

c. Sunflower Meal

Sunflower meal contains high amounts of protein ranging from 20 to 50% and higher percentages of proteins are obtained after dehulling of seeds. Sunflower proteins are devoid of any toxic substance and are low in anti-nutritional compounds, which make it an alternative protein source (Dorrell and Vick, 1997; Malik and Saini, 2017; Gonzalez-Perez and Vereijken, 2007 inside Malik and Saini, 2017). Sunflower meal is almost exclusively employed for poultry and cattle feeding owing to its high content of highly digestible protein with an important content of essential amino acid except for lysine and sulphur amino acid (González-Pérez and Vereijken, 2007 inside Hassaan et al., 2019). The sunflower meal was used to adjust the concentration of crude protein in the diets, so as not to include a new ingredient in the formulation (van Cleef et al., 2014).

d. Corn

The need of corn for feedmill industry increased in every year as still on going as the livestock industry development. The problem is that there is an asynchrony between the supply and demand of corn for feed (Swastika et al., 2011). The feed cost of the high concentrate fed system was almost 60% higher than that of the high hay fed system and approximately 78% greater than the grass only fed system. Moreover, the high hay fed system was 57% more efficient compared with the high concentrate fed in terms of feed cost efficiency by body weight gain. In contrast, the grass only fed system was only 42% more efficient than the high concentrate fed system. In addition, bodyweight and growth were high in animals in the high concentrate fed group, and the growth rate was slow and animal sizes were small in the grass only fed group (Sithyphone et al., 2011).

e. Urea Molasses Block

Urea molasses block (UMB) is one type of feed supplement which contains microelements. Supplementation from the UMB containing soluble carbohydrates provides NPN as a source of ammonia and minerals to enhance the formation of microbial protein. Bacteria produce enzymes which digest crude fibre and synthesize protein as a feed source for microbial protein (Adli and Sjofjan, 2018).

2.4 Housing

The pen is a one factor livestock environment, must be able provide assurance for a healthy life and comfortable in accordance with the demands of life efforts are made to build livestock and the pen must be able to protect livestock from interference from outside like sunburn, bad weather, rain and strong wind gusts. In general construction of the pen must be strong, easy to clean, aired well (Sandi and Purnama, 2017). On a grazing with pasture fattening system, the housing has function as a shelter place in the night or day or at the hot weather so that the cattle productivity can be reached well and to avoid the cattle from grazing too early in the morning (Kaunang and Tulung, 2015). For a single type housing, the cattle placement is done at one line or one row, while the double type housing the cattle placement

is done at two rows and head to head or tail to tail. Between the two rows, are generally made for a walkway (Makkan et al., 2014). The loose system has advantages when it comes to the feeding, housing, and behaviour of the dairy cow. The dairy cows have a better welfare quality than those kept in tie-stalls (Popescu et al., 2014). Cows' needs for free movement are easier to meet in a loose housing system (free-stall herds) than in a tie-stall system and consequently loose housing systems (free-stall herds) are becoming widely used in Western countries (Telezhenko and Bergsten, 2005 inside Kara et al., 2011). On the other hand, it has been reported that lameness is more common in loose housing systems (free-stall herds) than in tie stalls (Phillips and Morris, 2001 inside Kara et al., 2011).

Most walkways and stall surfaces in cattle houses are concrete because it is fairly durable, cheap and resistant to wear and has acceptable hygienic characteristics. However, hardness, abrasiveness and slipperiness are less desired features of concrete floors and can contribute to foot lesions and lameness (Phillips and Morris, 2001; Telezhenko and Bergsten, 2005 inside Kara et al., 2011). Rubber floors are often installed in selective areas in which cows spend a significant amount of time standing or walking (i.e., feeding alleys and return walking lanes) with the perception that a softer surface will reduce pressure on the claws, reduce incidence of lameness, and lessen claw growth and wear (Kara et al., 2011).

New-born calves less than two weeks old were kept in individual pens (average of three per week) with wheat straw bedding, while older (2 to 8 weeks of age) calves were kept in group pens on the opposite side, also bedded with wheat straw (Kaufman et al., 2015).

2.5 Handling

Handling management is an effort made by humans to animals with the aim of controlling animals the way we want without hurting the animal and without injuring the executor of handling. In general, handling is a method of handling animals that makes animals restricted in motion so that it is easy to be controlled either by using the aid of tools or with only using hands (Awaludin et al., 2017).

There are many advantages in dehorning cattle including reduced carcass bruising, improved handling of cattle in yards, reduced dominance at feed troughs and increased safety for stockmen especially in extensive areas (Loxton et al.,1982). Dehorning should be done when the calf is less than 3 months of age (1, 3). The developing horns of calves 3 month of age or older are normally removed surgically by a number of techniques (e.g., scooping, shearing, and sawing), Horn buds of younger calves are typically removed with a caustic paste or a hot iron (Faulkner and Weary, 2000).

Dehorning was carried out with an electrically heated dehorner applied for 15 s. Initial studies were carried out in which the temperature of the surface of the dehorner was measured during heating, just prior to and after dehorning; it was concluded that a warm up time of 15 min was sufficient to obtain a temperature of approximately 600°C (Gründer 1970 inside GRØNDAHL-NIELSEN et al.,1999).

Castration is routine management in most livestock production systems with the process of eliminating function reproductive organs in a deadly way male sex cells. More castration cows are easy in terms of handling and improve the quality of meat (Grandin, 2015). Castration has function to avoid inbreeding, increases fatty tissues in the carcass and selecting

livestock that will not be used as feeder livestock (Priyanto et al., 2019). The method of sterilization carried out on cattle is castration for male and ovariohysterectomy for female. Castration with a surgical procedure has some complications including inflammation of the scrotum, hemorrhage, and infection (Indraswari et al., 2020).

2.6 Reproduction

Detection of estrus by visual observation of standing to be mounted was performed for 30 to 45 minutes 4 times/d (1 AM, 7 AM, 2 PM, and 8 PM) (Romano et al., 2013). Estrus detection of cows and inseminations done on standing heat, not secondary signs. These studies indicated that maximum pregnancy rates were obtained from mid-estrus until a few hours after the end of standing behavior (Roelofs et al., 2010). Pregnancy diagnosis methods used so far include rectal palpation and ultrasound (USG) methods (Sayuti et al., 2016). Viability of sperm diluted in freezing media followed by refrigeration at 4°C (Vieira et al., 2013).

Each animal received an intramuscular injection of prostaglandin PGF2-a (4 ml Lutalyse, which equals 20 mg prostaglandin PGF2-a) and a second injection of 5 ml LutalyseTM 12 days later. This treatment results in -75% of animals exhibiting estrus in a relatively synchronized manner (onset of estrus is spread over 3 days) and ovulating -28 hours after first detected in estrus. (Amann et al., 1999).

2.7 Calf Management

Most producers reported intervening to assist with colostrum intake if they believed the calf did not suck adequately. Assisting with colostrum intake has been associated with reducing the risk of failed transfer of passive immunity (Filteau et al., 2003 inside Murray et al., 2016). On-farm computer to manage beef cow or calf records can increase record-keeping flexibility (Pruitt et al., 2012). Ensuring the environment where the calf is born is clean is essential to limit the transmission of disease to both the dam and her calf (Creutzinger and Proudfoot, 2020). Calves fed large amounts of milk replacer (MR) gain more body weight preweaning than calves fed less-aggressive programs (Chapman et al., 2016).

2.8 Vaccination and Medicine

Vaccination and sanitation are arguably the most significant strategies to prevent infectious diseases and to improve the health of domestic animals. Vaccinated animals are likely to be protected against target diseases through antigen specific protection (Yun et al., 2014). Probiotics and prebiotics both have great potential in livestock productivity as well as human health (Uyeno et al., 2015). Preweaning health management programs are generally important to cattle buyers because of their significant role in determination of profitability and economic risk (Roeber et al., 2001). Cattle health has been ascertained by visually assessing animal behavior or by manual inspections from a farmer or veterinarian (Smith et al., 2006).

CHAPTER III
METHODOLOGY

3.1 Location and time

This internship program was conducted at Thai Saree Farm, Klong Khlung District, Khampaeng Phet Province, Thailand from 1st November – 2nd December 2018.

3.2 Object of study

The object of study used during the internship is rearing management of beef cattle farm at Thai saree farm, Khlong klung, Kamphaeng Phet, Thailand.

3.3 Methodology

The method which was used during internship was by participating directly in all Thai Saree breeding activities or indirectly related to the object of study. The activities include farm management, feeding, housing, handling, reproduction, calf management, medication and vaccination, etc. Another data collected by doing interviews or discussion with manager and employees of the farm related to beef cattle farm rearing management. Observation was used to collect primary data based on recording, information and fact in the farm. All data and facts also used to compare with the literature.

3.4 Terminologies

1. DM, A material that consists of all constituents excluding water.

2. Bos Indicus, A species originating from tropical climates that have good adaptability, but poor productivity.

3. Bos Taurus, A species of cow originating from a European country that has the characteristics of large bodyweight, high productivity, but has a deficiency that is susceptible to disease and difficult to adapt.

4. Concentrate, Animal feed which contains low-energy crude fiber and high BETN and is easily digested by livestock. Good nutrient content in concentrate feed is containing crude fiber (SK) <18%, energy forming substance (TDN)> 60% and contains high dry protein.

5. Grazing, A method of feeding in which herbivores feed on plants such as grasses, or multicellular organisms such as algae. In agriculture, grazing is once a method used for domestic uses and other forage into meat, milk, and other products.

6. Hay, Are grass, legumes, or other herbaceous plants that have been cut and dried to be stored as animal fodder, especially for large grazing animals raised as livestock, such as cattle, horses, goats, and sheep. However, it was also fed to smaller domesticated animals such as rabbits and

guinea pigs. Even pigs may be fed, but they don’t digest it efficiently as herbivores.

7. Manure, Organic matter, mostly derived from animal cases, which can be used as organic fertilizer in agriculture. Manures contribute to fertility by adding organic matter and nutrients, such as nitrogen, that are utilized by bacteria, fungi, and other organisms in the soil. Higher organisms then feed on the fungi and bacteria that comprise the food web.

8. Oestrus, referring to the phase when the female is sexually receptive. Under regulation by gonadotropic hormones, mature ovarian follicles and estrogen secretions exert their biggest influence.

9. Perennial, A plant that lives more than two years. The term is often used to differentiate from short-lived annuals and biennials. The term is also widely used for growing plants and trees, which are also technically perennials.

10. USG, A diagnostic imaging technique based on the application of ultrasound. It is used as an image of internal body structures such as tendons, muscles, joints, blood vessels, and internal organs.

11. Vaccine, A natural preparation for active immunity to a particular disease.

CHAPTER IV
RESULT AND DISCUSSION

4.1 Farm Description

4.1.1 Geographical Location

The location of Thai Saree Farm (TS Farm), the place of the internship is in Mou 12, Klong Khlung, Khampaeng Phet 672/1, Thailand. Thai Saree Farm has an office near the laneway to get the data efficiently, the Brahman shed, Charolais shed, Beefmaster shed, and superior bull shed are separated to prevent the cattle fighting. Thai Saree Farm has two feed storages and a warehouse but they are located far from the office. Thai Saree Farm also has pangola pastures around the farm for cattle grazing or feed supply, 26 sheds around the farm, sheds for grazing, feedlot, shed for pregnancy cow, and was building a new big shed near the feed storage and warehouse. The figure 1 shows the geographical location of Thai Saree Farm.

Figure 1. Thai Saree Farm Map

4.1.2 History of Thai Saree Farm

Thai Saree Farm has been established starting from 1991. It is owned by Mr. Sittipong Kittiphakon. He and his family also own a feed mill industry near the farm and approximately 1.700 acres of land for pangola grass plantation. The organization structure is like shown in the Figure 2.

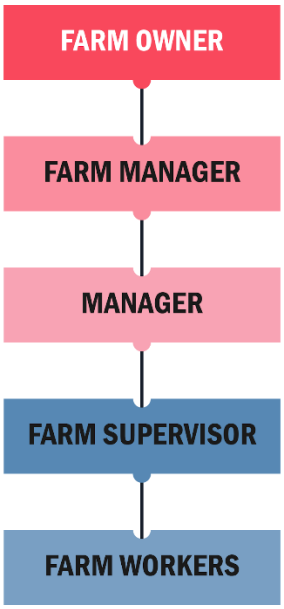

Figure 2. The organization structure

To achieve the goals of the organization, a system called organization structure is used to outline how certain activities of every member including rules, roles and responsibilities are directed. The organizational structure also determines the information flows between levels and allows companies to remain focused and efficient.

The management members of Thai Saree Farm company are 5 people. There is the owner Mr. Sittipong Kittiphakon usually called Pi Fok, responsible to organize general manager and farm manager. The general manager Pi Pum, responsible to organize the data recording, selling and cooperating with the farm manager to manage the farm. The farm manager Pi Em, responsible to manage all the cattle in the farm including health check and the workers also Pi Em, Pi Wid and Pi Neu.

4.2 Beef Cattle Rearing Management

In Thailand, beef cattle farming generally uses 3 major systems. Those are the cow-calf system, stocker cattle system and cattle finishing system. Breeding farms like Thai Saree Farm are categorized into a cow-calf system. It is comparable to Bunmee et al. (2018) that generally, cow-calf operations raise their stock primarily on pasture and other forms of roughage, rather than grain-based concentrate feeds.

Cattle manure is used to maintain soil fertility in rice production. Pens are also provided for cattle sheds during the rest time from dusk until morning. The pens are separated from the pasture, and it needs the assistance of the laborers to regularly move the cattles from pasture to pens and vice versa.

The pens and pastures are classified based on the kinds and status of the cattle groups to ease the management of each group that have relatively the same needs. This is also done to control the reproduction activities and avoid the harm risk such as accidents and disease spreading. There are also groups that stay only in pens due to its intensive needs such as a newly born calf and its cow and other cattle with certain special needs.

Besides usual pens, there are pens with cattle chute to ease handling while cattle are receiving checks and treatments. In this kind of pen, cattle are monitored regularly whether it is the weight, health status, or pregnancy. And treated regularly whether it is medication, vaccination, grooming or artificial insemination.

Additional feed beside grass grazed directly from the pasture is given depending on the needs of the cattle and the availability of grass in the pasture. During the dry season, usually grass needs to be taken from outside the pasture.

The breeds produced from Thai Saree Farm are Brahman, Charolais crossed with Brahman and Beefmaster. The breeding tends to focus more on maintaining those kinds of breeds while enhancing the quality through the selection of parents by looking at the phenotype. Reproductions are done both naturally and artificially. To produce quality beef cattle offsprings, the treatments are done at the very beginning of calving to make sure the cattle can have maximum potential to be future parents stock. So, the breeding activity is not only about the reproduction but also how the cattle are reared to reach its maximum genetic potential.

4.3 Kinds of Beef Cattle

4.3.1 Beefmaster

Beefmaster is one kind of beef cattle in Thai Saree Farm, it has a big body and brown red color. It has horns but has been dehorned already, as it is comparable to Susilorini et al. (2018) stated that the body doesn't have special color and it has a big, deep, and long body. It has horns, fast growing, and the carcass quality is great. It has a good ability to adapt to any climate. In 2018, Thai Saree Farm has about 50 Beefmaster cattle. The beefmaster cattle is shown in the figure 3.

Figure 3. Beefmaster cattle

4.3.2 Brahman Cross

The Brahman cross raised in Thai Saree Farm is American Brahman. Brahman cattle is a *Bos indicus* breed which has been domesticated in India but was experiencing rapid development in the United States. The characteristics of American Brahman cattle are big bump, loose skin with many folds under the neck and stomach, those are the special characteristics of *Bos indicus* breeds. American Brahman is a common beef cattle breed for breeding in Thailand. According to Chantalakhana (1984), most cattle in Thailand are still the indigenous breed even though Brahman crossbreds can be found in many areas due to the introduction of Brahman bulls into villages by the Department of Livestock

Development during the last 2-3 decades. In 2018, Thai Saree Farm has about 250 American Brahman cattle and become the mainly large breed in Thai Saree Farm. The American Brahman cattle is shown in the figure 4.

Figure 4. American Brahman cattle

4.3.3 Charolais

Charolais cattle is a *Bos taurus* cattle which has been domesticated and developed in France. This cattle has rapid development in the USA after being brought in 1966 of pure Charolais from France. The characteristics of Charolais cattle are light yellow or clear white such as silver skin color, has big body and rapid growth, strong body, and able to digest the forages efficiently for its growth and body weight addition. The Charolais cattle is shown in the figure 5.

Figure 5. Charolais cattle

Charolais is the second largest number in Thai Saree Farm. In 2018, Thai Saree Farm has about 100 Charolais cattle. Charolais is commonly used to do cross breeding in Thai Saree Farm, it is used to get pure Beefmaster breed. It is comparable to the Bureau of Biotechnology in Livestock Production (2018 in Thiwaratkoon et al., 2018) stated that Charolais is the most common beef breed used for terminal crossing with *Bos indicus* such as Thai native breed and Brahman for commercial beef production in Thailand.

4.4 Feed Management

The feed plays an important role in a beef cattle breeding farm. A healthy and enough nutrient of the feed will fulfill the cattle's needs to maintain the cattle's growth ability. In Thai

Saree Farm, there are two types of feed given, a concentrate feed and a forage. This section will explain each of the feed sources, number of the feed ratio given and the time to give the feed.

4.4.1 Pangola Grass

Figure 6. Pangola grass

Pangola grass (*Digitaria decumbens*) is a common grass used as a feed source in the grazing area in Thai Saree Farm. It is comparable to Tikam et al. (2013) stated that pangola grass cultivication has now been introduced into all regions in Thailand and the farmers are now planting and using pangola grass widely as a crop for raising animals. The pangola grass is shown in the figure 6.

Every afternoon, the pangola grass is watered by using a big pipe. It is used to maintain the pangola grass growth. The pangola grass can reach up to 120 cm height, so it will be cut once every 2 or 3 months. It is comparable to Tikam et al. (2013) stated that the stems are up to 120 cm high. Once every 6 months, the pangola grass is burnt to grow new stems and to keep the pangola grass growth. Based on that, Tikam et al. (2013) stated that pangola grass is a stoloniferous perennial and when established, it spreads rapidly by stolons and it doesn't produce viable seeds.

Beside fresh pangola, the pangola is also made as a hay in Thai Saree Farm. There is a special field outside the farm to grow the pangola grass which will be made as hay. The farmer will use a tractor automatically to collect and make hay. And then it will be stored in the feed storage in the farm. It is comparable to Hsieh et al. (2017) stated that pangola grass is a good source of forage and can be fed by fresh, hay or silage format also in proper environments, pangola grass can support better ruminant performance in terms of milk yield and composition, body weight gain, feed conversion ratio and meat quality. The pangola grass has crude protein contain about 7,9% (Animal Nutrition Division, 2004 in Tikam, et al., 2013).

4.4.2 Cassava

The cassava (*Manihot esculenta*) is one of the concentrate feeds used in Thai Saree Farm. It is given to the cattle in the feedlot area. The ratio of cassava given to the cattle is 3kg/cattle/day in every evening. According to Jetana et al. (2015) stated that cassava meal contains high levels of readily soluble carbohydrates, but low N content and is highly

degradable in the rumen compared with other energy sources. The cassava is shown in the figure 7.

Figure 7. Cassava concentrate.

4.4.3 Sunflower Meal

Sunflower meal is used as a mixed feed concentrate material in Thai Saree Farm. The ratio used as a material is 30 kg of sunflower meal in one concentrate mixing process. It is comparable to van Cleef et al. (2014) stated that the sunflower meal was used to adjust the concentration of crude protein in the diets, so as not to include a new ingredient in the formulation. The sunflower meal is shown in the figure 8.

Figure 8. Sunflower meal

Sunflower meal is also used as an alternative concentrate feed containing high protein which will be helpful to make a high quality of beef cattle. It is comparable to Dorrell and Vick (1997); Malik and Saini (2017); Gonzalez-Perez and Vereijken (2007 in Malik and Saini, 2017) stated that sunflower meal contains high amounts of protein ranging from 20 to 50% and higher percentage of proteins are obtained after dehulling of seeds. Sunflower proteins are devoid of any toxic substance and are low in anti-nutritional compounds, which make it an alternative protein source.

4.4.4 Corn

Corn is used as another mixed feed concentrate material in Thai Saree Farm. The ratio used as a material is 50 kg of corn in one concentrate mixing process. According to Swastika et al. (2011) stated that the need of corn for feed mill industry increased in every year as still on going as the livestock industry development but the problem is that there is

an asynchrony between the supply and demand of corn for feed and food for humans. The corn concentrate is shown in the figure 9.

Figure 9. Corn concentrate

In one concentrate mixing process will produce about 15 sacks of mixed feed concentrate. The mixed concentrate is given to calving cow with ratio 2,5 kg/cow 2 times/day, 2 kg/cattle/day for every male cattle in every evening, 1 kg/cattle/day for every weaned cattle, and 6 – 7 kg/cattle/day for every big cattle with high body weight. According to Sithyphone et al. (2011) stated that bodyweight and growth were high in animals in the high concentrate fed group, and the growth rate was slow and animal sizes were small in the grass only fed group. The feed concentrate mixing process was done by manually putting the feeds into the feed mixer machine and then the mixed feed concentrate will be put into an empty sack.

4.4.5 Urea Molasses Block

Figure 10. Urea Molasses Block (UMB)

Urea Molasses Block (UMB) is used as a feed supplement for beef cattle in Thai Saree Farm. The UMB is placed on the corner of the cage and it will be changed every month. It is comparable to Adli and Sjofjan (2018) stated that UMB is one type of feed supplement which contains microelements containing soluble carbohydrates which provide NPN as a source of ammonia and minerals to enhance the formation of microbial protein which can help crude fiber digestion. The urea molasses block (UMB) is shown in the figure 10.

4.5 Housing

Housing of beef cattle has an important role for the breeders. Good housing should meet the requirements of good housing management including a suitable location of the housing. It is comparable to Sandi and Purnama (2017) stated that housing is one kind of livestock living factor, it must ensure a healthy and comfortable life for livestock according to the livestock life needs, and the housing must be able to protect the livestock from external interference such as sunburn, bad weather, rain, and wind gusts. Generally, the housing construction must be strong, easy to clean, and has good circulation.

Thai Saree Farm uses a square-shaped housing size approximately 2 x 3 m and ± 2 x 4 m for the open yard behind the housing, the floor of the housing is made by using concrete but the open yard only uses flat ground. The material of the housing should be qualified for the cattle to get comfort, the floor should be strong, has high durability, not slippery, and easy to clean. Thai Saree Farm has four types of housing, those are housing for calves, housing for grazing, housing for feedlot, and housing for pregnant cow, with the total of housing are 27, 7 for pregnant cow, 4 for grazing cattle, 15 for feedlot cattle, and 1 housing for calves.

The calf housing in Thai Saree Farm is used for the separation between the calves and their mothers. It is comparable to Kaufman et al. (2015) stated that the new-born calves less than two weeks old were kept in individual pens (average of three per week) with wheat straw bedding, while older (2 to 8 weeks of age) calves were kept in group pens on the opposite side, also bedded with wheat straw. In the morning at 06.00 am and in the afternoon at 05.00 – 06.00 pm, the calves are brought to their mothers to get milk and will be put back into the calf housing after the calves stopped to drink.

The floor of the housing has many variants. In the main housing, Thai Saree Farm uses a concrete floor and the yard uses a plain ground. It will make it easy to clean the housing as we can just only wipe out the feces. It is comparable to Phillips and Morris (2001); Telezhenko and Bergsten (2005 in Kara et al., 2011) stated that most walkways and stall surfaces in cattle houses are concrete because it is fairly durable, cheap and resistant to wear and has acceptable hygienic characteristics. However, hardness, abrasiveness and slipperiness are less desired features of concrete floors and can contribute to foot lesions and lameness. It is observed that there are some cattle which have foot injury and lameness in Thai Saree Farm because of the use of concrete floor, it is advised to use a soft floor surface to prevent it. According to Kara et al. (2011) stated that rubber floors are often installed in selective areas in which cows spend a significant amount of time standing or walking (i.e., feeding alleys and return walking lanes) with the perception that a softer surface will reduce pressure on the claws, reduce incidence of lameness, and lessen claw growth and wear.

And for the housing for grazing, Thai Saree Farm uses a dry plain ground floor because the cattles were always put at the grazing area. It is comparable to Kaunang and Tulung (2015) stated that on a grazing with pasture fattening system, the housing has function as a shelter place in the night or day or at the hot weather so that the cattle productivity can be reached well and to avoid the cattle from grazing too early in the morning. Also, the housing won’t be cleaned for some period. If it will be cleaned, Thai Saree Farm will use a tractor to clean the floor for some period.

In Thai Saree Farm, the housing has two types, those are single type housing and double type housing. In the single type housing, the housing will be put for one breed only in a row. And in the double type housing, the housing will be put for American Brahman and Charolais only which has two rows head-to-head and the middle lane is used for a walkway to put a feed on the feed place. It is comparable to Makkan et al. (2014) stated that for a single type housing, the cattle placement is done at one line or one row, while the double type housing the cattle placement is done at two rows and head-to-head or tail to tail. Between the two rows, are generally made for a walkway.

The loose housing system is also used in Thai Saree Farm. It makes the cattle free to move in the housing area and also it helps the farmer to monitor the cattle easily. It is comparable to Telezhenko and Bergsten (2005 in Kara et al., 2011) stated that cows' needs for free movement are easier to meet in a loose housing system (free-stall herds) than in a tie-stall system and consequently loose housing systems (free-stall herds) are becoming widely used in Western countries. The main problem in the loose housing system is difficult to handle the cattle which wanted to move, so it needs an extra effort to handle the cattle in this housing system and also it can make some foot injury to the cattle if the cattle slipped when running. It is comparable to Phillips and Morris (2001 in Kara et al., 2011) stated that on the other hand, it has been reported that lameness is more common in loose housing systems (free-stall herds) than in tie stalls.

4.6 Handling

Thai Saree Farm has many ways to handle the cattle with care. In Thailand, cattle handling is performed carefully especially for contest cattle. Handling activities in Thai Saree Farm are morning and evening walk, cutting and cleaning hoof, dehorning and washing every morning for contest cattle. It is comparable to Awaludin et al. (2017) stated that handling management is an effort made by humans to animals with the aim of controlling animals the way we want without hurting the animal and without injuring the executor of handling. In general, handling is a method of handling animals that makes animals restricted in motion so that it is easy to be controlled either by using the aid of tools or with only using hands.

4.6.1 Dehorning

Dehorning is an activity to stop the cattle horn growth. It is generally done to cattle breed which has a horn genetically. It is done to prevent any injury to other cattle or the farmer which is caused by the horn. In Thai Saree Farm, dehorning is done on a young bull (after 2 months) by using a tool called electric dehorner. The cattle will be tied to prevent the cattle from running. And the process will be done in 5 – 10 seconds until the horn is burnt. After the dehorning process, the cattle will be given an ear tag. It is comparable to Loxton et al. (1982); Faulkner and Weary (2000); Gründer (1970 in GRØNDAHL-NIELSEN et al., 1999) stated that there are many advantages in dehorning cattle including reduced carcass bruising, improved handling of cattle in yards, reduced dominance at feed troughs and increased safety for stockmen especially on extensive areas. It should be done on the calf less than 3 months of age by using a caustic paste or a hot iron for 15 seconds, the older cattle normally will be

done in any surgical techniques (e.g., scooping, shearing, and sawing) to remove the cattle horn.

4.7 Reproduction

Reproduction is one of management in a beef cattle breeding farm. It has a function to detect the pregnancy and do a recording to the cattle. In Thai Saree Farm, the reproduction management is including mating and recording.

4.7.1 Mating System

In Thai Saree Farm, there are two treatments of mating, which are using an Artificial Insemination (AI) and natural mating. While in thai saree farm the mating system is carried out only using AI and not using natural mating, because AI can be done on more cattle than natural mating and also when female cattle are in estrus, AI can immediately do it without having to wait for the male cattle to felt the appetency at the same time. The AI semen is stored in a container containing a cool liquid nitrogen. It is comparable to Vieira et al. (2013) stated that the viability of sperm diluted in freezing media followed by refrigeration at 4°C. For a Beefmaster and Charolais, after 14 – 16 months of age, they will be given an Artificial Insemination, and so does the American Brahman will be given an Artificial Insemination after 18 – 20 months of age if the cattle show estrus signs. In natural mating, the female cattle will be put in an open yard with a productive bull (healthy and strong condition). According to Roelofs et al. (2010); Romano et al. (2013) stated that the detection of estrus by visual observation of standing to be mounted was performed for 30 to 45 minutes 4 times/d (1 AM, 7 AM, 2 PM, and 8 PM). And the inseminations done on standing heat, not secondary signs.

After the cattle are given an AI, the cattle will be injected with hormone injection of 2,5 ml GnRH and PGF2-a on the neck or back to stimulate the ovary cell. It is comparable to Amann et al. (1999) stated that each animal received an intramuscular injection of prostaglandin PGF2-a (4 ml Lutalyse, which equals 20 mg prostaglandin PGF2-a) and a second injection of 5 ml LutalyseTM 12 days later. This treatment results in 75% of animals exhibiting estrus in a relatively synchronized manner (onset of estrus is spread over 3 days) and ovulating 28 hours after first detected in estrus.

4.7.2 Pregnancy Recording

The recording is carried out from the start, giving AI to female cattle and is carried out regularly for each recorded cattle. The monitoring process is carried out by moving the cattle that have been scheduled for that day to be checked using USG. Cattle moving is done manually by opening the cattle cages and directing the cattle to a special laneway for AI. After 18 – 21 days of AI, the cattle will be monitored by using a USG. It is comparable to Sayuti et al. (2016) stated that the pregnancy diagnoses method used so far include rectal palpation and ultrasound (USG) methods. If it doesn’t show any estrous signs, the cattle will be given an AI once again. After 30 days of second AI injection, it will show a pregnancy.

4.8 Calf Management

In Thai Saree farm, the new born calves were weighed and measured, the information was recorded on computer to manage the record keeping of each cattle or newborn calves on the farm. It is comparable to Pruitt et al. (2012) stated that on-farm computer to manage beef cattle or calf records can increase record-keeping flexibility. And the farmers in Thai Saree Farm assisted the newborn calves to drink colostrum milk / milk from the dam every morning and evening, this was done to ensure the calves drink adequate milk. According to Filteau et al. (2003); Murray et al. (2016) stated that most producers reported intervening to assist with colostrum intake if they believed the calf did not suck adequately. Assisting with colostrum intake has been associated with reducing the risk of failed transfer of passive immunity. Also, in some cases if the dam can't feed its newborn calves due to some infection on udders because of mastitis, the farmer will feed the calves with milk replacer and it is known that calves fed with large amounts of milk replacer have more body weight. It is comparable to Chapman et al. (2016). The calves fed large amounts of milk replacer (MR) gain more body weight preweaning than the calves fed less-aggressive programs. While calves on its milking session, the farmer cleaned the pen where the calves stay, to ensure the environment is healthy for the calves and maintain a limit of disease transmission to both dams or other calves. According to Creutzinger and Proudfoot (2020) stated that ensuring the environment where the calf is born is clean is essential to limit the transmission of disease to both the dam and her calf.

4.9 Vaccination and Medicine

Thai Saree farm concern about their cattle health and the sanitation of the pens, it helps to maintain and control to prevent infectious disease to be transmitted from the animals to humans or animals to animals, this was done by a regular cleaning of the pen in every morning and by vaccines that applied to the cattle. According to Yun et al. (2014) Vaccination and sanitation are arguably the most significant strategies to prevent infectious diseases and to improve the health of domestic animals. Vaccinated animals are likely to be protected against target diseases through antigen specific. Not only Vaccines some probiotic and prebiotic (Iron Dextren, Vitamin A, D, E, and Biocathaline) also injected or given to increase the productivity of the cattle It is comparable to Uyeno et al. (2015) stated that probiotics and prebiotics both have great potential in livestock productivity as well as human health. The health management for the cattle been started from the 1st day of birth by injecting Vitamin A, D, E and Fe (iron dextren) and After 45 days of birth, the calves was given Vitamin A D E, and biochataline for metabolism (each 5ml), and anti-parasite into mouth (20ml). According to Roeber et al. (2001) stated that preweaning health management programs are generally important to cattle buyers because of their significant role in determination of profitability and economic risk. The farmers in Thai Saree Farm ensure the health of each cattle and calf by monitoring and assessing the cattle behavior by visual or even by manual inspection. It is comparable to Smith et al. (2006) stated that cattle health has been ascertained by visually assessing animal behavior or by manual inspections from a farmer or veterinarian.

4.10 Waste Management

Waste management is the name for the process of monitoring, collecting, sending, disposing, and recycling waste. This waste management is carried out to prevent earth pollution which can affect the environment and human health. There are three methods that can be done for garbage disposal, the first is by burning the waste, the second is burying the waste into the ground, and the third is maintaining the waste for re-use and re-cycle so that the waste can be reused for the good of the environment and humans. Thai saree farms uses a sustainable method by drag the manure go to outside the housing and the rest of the manure is swept away with a broomstick. All of the manure is transported to pangola planting land and sprinkled throughout the land.

CHAPTER V
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The result from the internship is shown that there are three cattle breeds in the farm which are American Brahman, Beefmaster, and Charolais. Each breed has different numbers reared in the farm, which the American Brahman has the biggest number followed by Charolais and then Beefmaster. There are two types of feed used in Thai Saree Farm, which are from forages and concentrate. The forages used in the farm are pangola grass and hay, while the concentrate feed used are cassava and mixed feed (consist of corn and sunflower meal). Urea Molasses Block (UMB) is used as a supplement feed. There are some housing in Thai Saree Farm, which are housing for calves, housing for grazing, housing for feedlot, and housing for pregnant cow, with the total of housing are 27, 7 for pregnant cow, 4 for grazing cattle, 15 for feedlot cattle, and 1 housing for calves. The handling done in the farm is dehorning the young bull. For the reproduction activities consist of cattle mating (by using AI or naturally) and pregnancy monitoring. The medicine and vaccination were injected to the cattle in the monitoring area which have a benefit to prevent the cattle from sickness and disease. The calves were handled by helping them to milk to their mother or by giving them a milk replacer.

5.2 Recommendation

The farmer should write the monitoring result into a computer software instead of in a book, so it can be efficient to monitor the data in the farm.

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APPENDIX

Appendix 1. Monitoring Card of Internship

MONITORING CARD OF INTERNSHIP
AT THAI SAREE FARM

Name:	SIN:
Mumtaz Muzaffar	175050100111067
Ryan Dwi Cahyono	175050100111070
Wisnu Yoga Nugraha	175050100111101
Muhammad Raffif Rifano	175050101111096

Program : Animal Science
Date of Internship : 1st November 2018 – 2nd December 2018

Day	Date	Working Time	Activities
1	01 November 2018	10.00 am	Arrived at Thai Saree Farm
		04.00 pm - 06.00 pm	1. Closing the cages
2	02 November 2018	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
3	03 November 2018	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
4	04 November 2018	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves

		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	Off
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
5	**05 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
6	**06 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
7	**07 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages

8	**08 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
9	**09 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
10	**10 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
11	**11 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	Off
		04.00 pm - 06.00	1. Moving the cattle back to the cage

		pm	2. Milking the calves
			3. Closing the cages
12	**12 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
13	**13 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
			3. Burning the dry pasture
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
14	**14 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
15	**15 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00	1. Cleaning cages

		pm	2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Collecting hay
			2. Put the hay into the feed storage
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
16	**16 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
17	**17 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
18	**18 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	Off
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
19	**19 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing

			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
20	**20 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
21	**21 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
22	**22 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves

			3. Closing the cages
23	**23 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
			3. Burning the dry pasture
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
24	**24 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
25	**25 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	Off
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
26	**26 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures

		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
27	**27 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
28	**28 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
29	**29 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
			3. Watering the pastures
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
30	**30 November 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing

			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
31	**01 December 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Vitamin and vaccination injection
		04.00 pm - 06.00 pm	1. Moving the cattle back to the cage
			2. Milking the calves
			3. Closing the cages
32	**02 December 2018**	06.00 am - 08.00 am	1. Opening the cages and handling the cattle to grazing
			2. Milking the calves
		09.00 am - 12.00 pm	1. Cleaning cages
			2. Handling the cattle to monitoring area
			3. Watering the pastures
		01.00 pm - 04.00 pm	1. Monitoring the cattle
			2. Artificial Insemination
		04.00 pm - 06.00 pm	Off