RESULTS OF ASSESSMENT OF SOME REPRODUCTIVE INDICATORS WHEN USING WAGYU BOVINE SEMEN ON HYBRID HF CATTLE IN BA VI AND THE GROWTH CAPACITY OF THE HERD IS BORN

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ABSTRACT

The aim of this study to evaluate a number of reproductive indicators when using Wagyu bovine semen in the HF cattle breeding herd in Ba Vi bred in the area of Ba Vi Cattle and Forage Research Center. The experiment monitored 245 healthy HF bovine cows without infectious diseases and reproductive diseases, with normal reproductive ability, without defects in appearance as well as in reproductive organs; The bovine cows were bred or bred, aged from 3-6 years, weight ≥ 300 kg for bovine cows and ≥ 400 kg for breeding cows. Select 50 male and 50 female calves from the HF cross cow herd. During the experiment period, some reproductive results were monitored, the growth of calves born from the HF hybrid cow herd and common diseases and the rejection rate of the experimental cattle herd. As a result, the fetal time of HF cows hybridized when artificially fertilized with Wagyu bulls has an average time of 283,29 days; the percentage of female calves born is 53,55%; the percentage of male calves born is 46,45%; the time from calving to estrus is 95,54 days; the time from calving to pregnancy is 131,13 days. The birth weights of selected male and female calves born from hybrid HF herds were 34,4 kg and 32,6 kg, respectively. The mass at 3 months of age of male calves is 104 kg and that of female calves is 99,98 kg with a weight gain during this period of 773,22 and 748,66 grams/head/day/. Calves born with diarrhea 11,4% and Pneumonia 5,46% are the most common. The male calves are eliminated is 3,82% and female calves is 2,18% with the total number of difficult births is 7,10%.

Keywords: *Hybrid HF, Pregnancy period, Diseases, Mortality Rates*

INTRODUCTION

In recent years, dairy farms have become increasingly interested in using beef cow semen on dairy cows to increase farm profits and manage cow backlogs (Geiger, 2019). Sales of bovine semen in the US increased from 2,45 million doses in 2017 to 7,20 million doses in 2020, corresponding to a decrease in sales of bovine semen from 2,2 million doses in 2017 to 18,3 million doses in 2020 (NAAB, 2021). This increase is related to the use of beef cattle semen in dairy herds (McWhorter et al., 2020). While this strategy is not new, dairy farmers leverage technological advances in reproduction and genetics to maximize their income. The hybrid calves produced performed better in the fattening system, yielded higher sales value (Wolfova et al., 2007), and improved the overall efficiency of the milk production chain. Therefore, it is necessary to identify suitable breeding bulls to mate with dairy cows to optimize the productivity of females later.

Wagyu cattle are one of the cattle breeds that can improve the fat content of beef (Pezza, 2014). This breed has an average weight but a good weight gain rate, with an average drift of 900 g/head/day, a 64% slaughter rate, and a high cut fat score (Porter and Stone, 2008; Cottle and Kahn, 2014).

Not only is it high in shredded fat, but oleic acid and other simple fatty acids are also higher. High-fat content due to longer fattening time, lasting up to 30-35 months of age. Wagyu beef contains at least 4-7g of fat per 100g of meat while the maximum fat can reach 40g/100g of meat (Dikemen and Devine, 2014). Wagyu beef is of high quality labeled as Kobe beef and is exported from Japan. As a result, many countries have been producing Kobe-style beef.

Wagyu and Angus cross with at least 50% Wagyu blood have been used for this purpose and have been fattened for more than 350 days.

Through the monitoring period, we conducted an "Assessment of some reproductive indicators when using Wagyu bovine semen on hybrid HF cattle in Ba Vi and the growth capacity of the herd is born".

MATERIALS AND METHODS

Location, time and animals

245 HF cows have been bred and have bred, aged from 3-6 years; of which 13 cows have a mass of ≥ 300 kg and 232 cows have a mass of ≥ 400 kg.

Wagyu bull sperm number 0020B00305 is imported from Canada.

Implementation period: From January 2023 to December 2023 at Ba Vi Cattle and Forage Research Center.

Research content

The results of some breeding criteria of HF hybrid cows in Ba Vi when breeding using Wagyu bovine semen.

The results of the growth ability of calves born from HF crosses in Ba Vi when breeding using Wagyu bovine semen from infancy to the weaning stage.

Results of common diseases and elimination rate of HF cattle crossed in Ba Vi when breeding using Wagyu bovine semen.

Methods

Experimental cattle: 245 HF cows hybrids are healthy, free of infectious and reproductive diseases, have normal reproductive ability, and no defects in appearance as well as in the reproductive organs; post-breeding cows, aged from 3-6 years, weight ≥ 300 kg for post-breeding cows and ≥ 400 kg for breeding cows selected in this experiment. Selection of 50 male and 50 female calves born from HF cows with a birth weight of ≥ 25 kg, balanced appearance, firm skeleton, straight legs, and no deformities.

Nutrition and diet: Dry matter, crude protein, and daily energy exchange for cows through each period are calculated according to NRC standards (2016).

Foster care: Cows are kept in enclosures with separate feeding troughs and drinking troughs. The diet of fine food, green grass, and silage is feed twice a day in the morning from 7:00 to 8:00 and in the afternoon from 16:00 to 17:00, drinking water is freely provided. The ingredients are mixed well together, the green feed is cut 2 - 3 cm short with a slicer before mixing.

Feed materials of experimental cows:

Coarse feed (Elephant grass, hay, silage, maize silage), fine feed (De Heus 5959 mixed bran, maize flour), and vitamin mineral premix are show in Table 1.

Table 1. Diet of experimental cows

Material Composition	
Silage grass (kg)	10,5
Corn silage (kg)	10,5
Fresh elephant grass (kg)	35,0
Dried straw (kg)	1,4
Mixed bran (kg)	7,0
Cornstarch (kg)	1,5
Nutrition Value	
CP (%DM)	10,52
NDF (%DM)	56,00
ADF (%DM)	44,67
Ash (%DM)	5,93
ME (Mcal/kgDM)	2,76
Ca (%DM)	0,14
P (%DM)	0,07

** **Note**: DM: dry matter; CP: crude protein; NDF: neutral detergent fiber; ADF: acid detergent fiber; Ash: total mineral; ME: exchange energy*

Table 2. Nutrition value of feed

Nutrition Value	**Corn silage**	**Silage grass**	**Fresh elephant grass**	**Cornstarch**	**Dried straw**	**Mixed bran**
DM (%)	22,17	13,94	14,83	86,98	91,41	88,60
CP (%DM)	9,04	10,93	13,23	9,42	5,40	17,38
NDF(%DM)	68,29	73,92	73,35	29,12	75,51	46,03
ADF (%DM)	35,22	54,54	38,67	6,27	60,25	20,88
EE (%DM)	3,05	2,40	2,46	4,63	1,76	5,78
CF (%DM)	29,68	37,79	35,75	3,62	32,90	10,28
Ash (%DM)	5,89	10,93	9,77	1,31	9,84	12,87
ME (Mcal/kgDM)	2,82	2,39	2,54	3,32	2,31	3,05
Ca (%DM)	0,28	1,48	0,07	0,06	0,32	1,50
P (%DM)	0,26	0,90	0,06	0,30	0,13	1,20

** **Note**: DM: dry matter; CP: crude protein; NDF: neutral detergent fiber; ADF: acid detergent fiber; Ash: total mineral; ME: exchange energy*

Tracking metrics

The results of some breeding criteria of HF hybrid cows in Ba Vi when breeding using Wagyu bovine semen

Pregnancy period (days): The period from the date the cow becomes pregnant to the time the cow gives birth.

Time from birth to estrus (day): the period from birth to the first estrus.

Time from birth to re-pregnancy (day): the period from birth to the next pregnancy.

Male/female birth rate: The ratio of male/female births to the total number of births.

$$\text{Percentage of male calves born (\%)} = \frac{\text{Number of male calves born}}{\text{Total number of calves born}}$$

$$\text{Percentage of female calves born (\%)} = \frac{\text{Number of female calves born}}{\text{Total number of calves born}}$$

The results of the growth ability of calves born from HF crosses in Ba Vi when breeding using Wagyu cow semen from infancy to the weaning stage.

Weight at birth: Calves are born after dry cleaning to determine the weight by the clock balance (Nhon Hoa, 60kg) with an accuracy of 0,2 kg.

Weight of weaned calves (3 months old): Determined by Ruddweigh Australia Pty. Ltd's electronic cattle scale with an accuracy of 0,5 kg.

Absolute growth: Expressing the increase in body mass in units of time and calculated according to the formula:

$$A = \frac{P_2 - P_1}{t_2 - t_1}$$

There in: A is absolute growth (g/day), P_1 is the accumulated mass corresponding to time t_1, P_2 is the accumulated mass corresponding to time t_2

Results of common diseases and elimination rate of HF cattle hybridized in Ba Vi when breeding using Wagyu bovine semen.

Common diseases and elimination rates: Record cases of disease and elimination.

$$\text{Percentage of male calves discarded (\%)} = \frac{\text{Number of discarded male calves}}{\text{Total number of calves born}} \text{ x } 100\%$$

$$\text{Percentage of discarded female calves (\%)} = \frac{\text{Number of discarded female calves}}{\text{Total number of calves born}} \text{ x } 100\%$$

Difficult birth (%): Percentage of hard-to-live cows out of the total number of calves.

$$\text{Difficult birth rate (\%)} = \frac{\text{Number of difficult birth calves}}{\text{Total number of calves born}} \text{ x } 100\%$$

Statistical analysis

The data were statistically processed according to the ANOVA method on Minitab 16.0 software. The Tukey method was used to compare statistically significant differences between Mean values.

RESULTS AND DISCUSSION

The results of some breeding criteria of HF hybrid cows in Ba Vi when breeding using Wagyu bovine semen

Table 3. Some reproductive indicators of cows

Criteria	Unit	Mean ± SD
Number of calves monitored	calves	183
Pregnancy duration	date	283,29 ± 4,81
Percentage of female calves born	%	53,55
Percentage of male calves born	%	46,45
Time from birth to estrus	date	95,54 ± 15,50
Time from childbirth to pregnancy again	date	131,13 ± 15,01

Knowing the date of birth of the cow in advance to have good care to ensure the safety and health of both mother cows and calves is something that farmers need to pay great attention to. The cow is pregnant for 280 days (more than 9 months), so to calculate its birth date, it is necessary to calculate the date of mating plus 280 days. Previous studies indicate that the average gestation period of cows is 285 days.

From the study results of Table 3: The pregnancy time of Holstein Friesian cows when artificially inseminated with Wagyu bull sperm has an average time of 283.29 days with cows born as early as 275 days and cows as late as 290 days with this result, our results are higher than the results of (Amer *et al.,* 2016) the pregnancy time of dairy cows is 280-282 days. Usually, calves born to Wagyu males have a longer gestation period than calves born to other males. Rogers *et al.,* (2002) compared the gestation time between Angus cattle and Wagyu hybrids and found that Wagyu hybrids had a longer gestation time (288 days) when compared to Angus bulls (278 days). Numabe *et al.,* (2001) reported a gestation period of 292 days for Wagyu cows; Oyama *et al.,* (2004) indicated a gestation period of 289 days for Wagyu cows.

With a female birth rate of 53.55% and a male birth rate of 46.45%, it is possible to adjust the male/female ratio in livestock because the sex formation process depends not only on genotype but also on environmental conditions.

In fact, there is a difference in the productivity of a certain product between males and females. Therefore, the male/female ratio is adjusted so that the economic efficiency is the highest.

Understanding the sex ratio is an important feature in ensuring the reproductive efficiency of animal populations in livestock production and environmental protection. In animal husbandry, it is possible to calculate a ratio of males/females suitable for raising and maintaining stable herds. When the number of either sex increases and escapes the relative ratio, it is possible to exploit the number of individuals, reducing the cost of food and water and bringing economic efficiency. For the environment, knowing the male-to-male ratio of animal and plant species will reasonably exploit resources, helping the environment develop sustainably.

In Europe, beef cattle breeds are preferred for crossbreeding with dairy cattle breeds including BBB, Charolais, and Limousin (Vellinga and De Vries, 2018) while other breeds are used in Asia and the US (Brown *et al.,* 2016). The use of finely mixed beef cattle for dairy herds to increase meat production is a convenient strategy for both dairy and beef cattle breeding. The use of beef cattle semen on dairy farms is mainly on herds that are genetically inferior in

herds, to gradually remove their females from the dairy herd system (Ettema *et al.*, 2017). The combination of sexual refinement and cow broiler breeding has increased profits with 21.5% of cows being fertilized with beef cow semen and providing higher benefits on farms (Pahmeyer and Britz, 2020). On the other hand, many advantages can be highlighted in the beef supply chain. A large percentage of meat-oriented hybrid calves are likely born from good breeding males to improve quantitatively and quality of beef production (Bittante *et al.*, 2020a). Berry *et al.*, (2019) demonstrate that superior carcass and growth performance can be achieved with the selection of suitable breeding bulls for use in lactating females with low yield. Some studies show that the beef cow sperm blend for dairy cows has improved the conception rate by 1.37% and improved the average fertility parameters of the sold hybrid calves by 3 times compared to the pure Holstein calves (Bittante *et al.*, 2020b). In European dairy farm systems, the combination of the use of milking and beef delimitation on dairy herds is a unique strategy that allows for herd expansion with additional income (Murphy *et al.*, 2016).

Also in the results of Table 3: The time from birth to estrus in this experiment is 95.54 days and the pregnancy time is 131.13 days. Usually under good nourishment conditions, the ideal gestation period is about 3 months (usually ranging from 60 to 80 days) (Pursley et al.,2001; Gumen et al., 2003). However, in the reality of cattle breeding, especially those with high productivity, it is very difficult to achieve this optimal breeding time. For high-yield cows, the breeding period should take place in the 3rd or 4th month to extend the milking cycle (Washburn *et al.*, 2002).

The results of the growth ability of calves born from HF crosses in Ba Vi when breeding using Wagyu cow semen from infancy to weaning stage.

Table 4. Weight of calves from birth to weaning (3 months old)

Criteria	**Male** (n=50)	**Female** (n=50)	**P**
	Mean ± SD	Mean ± SD	
Birth weight (kg)	34,40 ± 3,67	32,60 ± 3,17	0,010
Birth at weaning (kg)	104,00 ± 4,86	99,98 ± 3,51	0,000
Absolute weight gain from birth to weaning (grams/animal/day)	773,22 ± 39,51	748,66 ± 28,54	0,001

The results of the study in Table 4 show that the volume of birth and weaning between male and female calves has a statistically significant difference (P<0.05). Specifically, the average infant mass of F1 Wagyu male and female calves born from HF hybrid cows is 34.4 kg and 32.6 kg, respectively. Due to being selected from the born calves, the mass of the monitored calves is much higher than that of Vu Chi Cuong (2007) on ½ Charolais calves in Dak Lak with an average birth weight of 22.3 - 23 kg and Pham Van Quyen (2010) when ½ Droughmaster and ½ Charolais in the Southeast with an average birth weight of 19.4 kg. The mass is also higher than that of pure Senepol calves born in Ba Vi with the birth weight of male calves at 32.52 kg and female calves at 31.0 kg (Phung Quang Truong, 2021). At the weaning stage, the average weight of the male herd is 104 kg and the female herd is 99.98 kg. Our results were higher than those for the ½ Charolais hybrid calf mass identified in the study by Dinh Van Tuyen *et al.*, 2010 (97.2 kg in males and 96.3 kg in females). From the results of birth and weaning we have the absolute weight gain of the male herd of 773.22 grams/head/day and the female herd of 746.66 grams/head/day. The weight gain during this period between the male and female calves was also statistically significant (P<0.05).

Results of common diseases and elimination rate of HF cattle hybridized in Ba Vi when breeding using Wagyu bovine semen.

Table 5. Monitoring some diseases in calves born

Disease Name	Number of calves monitored	Number of time get diseases	Ratio diseases (%)	Number of calves cured	Ratio cured (%)
Foot and mouth disease	183	0	0	0	0
Pasteurellosis	183	4	2,18	2	50
Tick born disease	183	7	3,82	4	57,14
Diarrhea	183	21	11,4	21	100
Pneumonia	183	10	5,46	5	50
Osteoarthritis	183	2	1,09	2	100
LSD disease	183	0	0	0	0
Pink eye	183	6	3,28	6	100

Table 6: Difficult birth rate and elimination of calves born

Criteria	Unit	Quantity	Rate (%)
Number of calves monitored	calves	183	100
Difficult birth rate	%	13	7,10
Male calves are eliminated	calves	7	3,82
Female calves are eliminated	calves	4	2,18

Through the monitoring period of 183 hybrid HF cows when being mated and pregnant, 13 animals encountered difficulty in giving birth, accounting for 7.10%. Normally, the rate of difficult birth in Holstein herds varies from 2 to 7% (Mee, 2008). Increased risk of difficult calving when dairy cows are mixed with beef cattle, especially European males (Mee, 2008). This risk is higher in larger beef cattle breeds, the risk of difficult calving increases possibly due to differences in the volume of newborn calves and gestation time. Difficult calving problems can also increase the mortality of calves both before and after birth, the likelihood of mortality increases as the fertility difficulty increases (Fouz *et al.,* 2013). Survival up to 24 hours and when weaned decreases in calves undergoing a difficult birth (Hickson *et al.,* 2006).

Dystocia is the term used to describe infertility and is defined as: a difficult birth due to prolonged delivery supported by traction (Stafford, 2011). A normal birth takes from 30 to 4 hours after the appearance of amniotic fluid rupture, difficult delivery in cows occurs when there is a failure of at least one of the three main components of the birth process: Thrust, the adequacy of the birth canal and the fetus (size or fetal position) (Stafford, 2011). The cause of the difficult birth will determine the intervention. It is common for the first litter of calves to show a balance between the fetus and the mother, abnormal fetal position, and narrowing of the vulva (Mee, 2008). In cows calving from litter two onwards, the most common causes are abnormal fetal position, multiple pregnancies, inert uterus, torsion, and cervical stenosis (Mee, 2008). The mismatch between the fetus and the mother cow is the most common type of malformation and is the result of the calf being too large compared to the mother cow. The main determinants of the balance ratio between the fetus and the mother cow are the mass of

the newborn calf and the size or live weight of the mother cow (Hickson *et al.,* 2008b). The mother-child relationship is influenced by the breeding male, the litter, the mass of the mother cow when mating, the age, mass, and physical condition of the mother cow (Mee, 2008). In dairy cows, to reduce the risk of difficult calving, preference is given to low-weight calves rather than increasing the area of the pelvis or eliminating small calves (Mee, 2008).

The main concern of dairy farmers when choosing a breeding bull for a dairy herd is the health and reproduction of the mother cow or hybrid cow (Cook, 2014). The main focus for the selection of breeding bulls for dairy herds is fertility, infant calves volume, and some different factors (Mee, 2008). The link between calf birth weight and difficult calving situation has caused dairy farmers to be concerned about the use of beef cow semen because beef cows can produce heavier calves than dairy cows. The gestation period of the calves is also important, as this has an effect on the distance between the two litters and the number of days of lactation of the mother cows (Donkersloot, 2014). Moreover, the production capacity of hybrid calves is also of great interest.

When making a decision on whether to use mixed beef cattle semen for a dairy herd, the factors the dairy herd to consider are the milk yield of the mother cow, the ability of the mother cow to become pregnant again, the duration of pregnancy, and the ease of childbirth. These factors contribute to boosting the profitability of dairy farmers (Dhakal *et al.*, 2013). If beef semen hurts these factors, farmers are at risk of a reduction in income.

Ease of calving is important because calving is difficult to increase labor costs, increases the risk of death of mother cows and calves, and can negatively impact the production process of the farm. The gestation period, although a characteristic of calves, is important to consider that the date of delivery determines the number of days of lactation (Holmes *et al.*, 2007). In addition, the shorter gestation period, whether compared to the average of the variety or other varieties used, can be used to narrow the maternity season or maintain the 365-day maternity gap (Donkersloot, 2014).

Birth weight should be considered first as it has been identified as a factor influencing fertility difficulty, pregnancy duration, milk production and the success of the breeding process. The infant mass of the calves is also associated with weight gain before weaning of the calves.

Birth weight is a factor that affects milk production, success in the breeding process, difficulty in laying, and pregnancy time. Factors affecting the volume of newborn calves include the breed, the sex of calves, and the litter of mother cows. Hybrid male calves tend to be heavier than hybrid female calves (Hickson *et al.*, 2015). As maternal cow age increases, the volume of newborn calves tends to increase (Dhakal *et al.*, 2013). The duration of pregnancy also affects the volume of newborn calves because the longer the gestation period, the more birth weight calves increas.

Shorter (<265 days) and longer (>285 days) gestation periods are associated with an increased risk of delivery disorders, particularly in utero cows (Mee, 2008). The increased risk of reproductive disorders due to shorter gestation periods may be due to increased rates of twins and calves in cows with short gestation periods. Increased risk of dystocia during longer pregnancies may be due to overgrown calves.

The risk and severity of hard calving in male calves are higher than in female calves (Fouz *et al.*, 2013). The support ratio of male calves is 1-13% higher than that of female calves (Lombard *et al.*, 2007).

Also in the results of Table 7, the number of discarded male calves was 7, accounting for 3,82% and the number of discarded female calves was 4, accounting for 2,18%.

Successful breeding of calves means that we have been able to have a dairy cow that produces a lot of milk and reproduces well.

Although feeding technology is now advanced, calves are still dying, alarmingly, and show no signs of improvement. The two things to do are to minimize difficult births and increase the immunity of calves by providing them with sufficient colostrum.

In Canada, the stillbirth rate is 12% for calves in litter 1 and 7% for calves in litter 2 onwards. About half of stillbirths can be attributed to difficult deliveries (dystocia).

Difficulty in giving birth will cause the consequence that the mother cow loses milk, inflammation, and poor fertility. The calves may be weak, have respiratory disease, or have diarrhea. Both mother and child may die.

The mortality rate before weaning is about 7,8-11%, of which 53% is due to diarrhea and 21% due to respiratory disease. Mortality and morbidity at this stage are attributed to the failure of immunization of colostrum calves.

The elimination of calves is one of the important issues of raising calves in dairy farms worldwide (Mandal *et al.,* 2019). Successful cow breeding systems include the ability to develop healthy calves from both an economic and animal welfare perspective. In general, prematurely discarded calves reduce and replace herds causing genetic loss due to reduced selectivity and producing less genetic benefit. Therefore, it can lead to a shortage of young cows to replace the herd. Calves discarded at birth often occur due to difficulty in calving and health problems of cows. In tropical areas, where zebu cows predominate, pre-weaning rates of calves are high and account for almost one-third of calves (Wells *et al.,* 1996). The percentage of milk calves discarded in the first 16 weeks of life in temperate climates varies and ranges from 8 to 12% (Torsein *et al.,* 2011).

The highest risk of calves elimination rate is usually observed in the first 3 weeks of life (Wells *et al.,* 1996). Discharge rates of calves during calving and after calving (within the first 24-48 hours after birth) mainly occur due to late calving (Gundelach *et al.,* 2009). The elimination status of Holstein calves was 3,23%; 2,66%; and 0.97% during the period from 1-30 days, 31-180 days, and 181-365 days, respectively (Fuerst-Waltl and Sorensen, 2010). Sheikh (2010) observed an average survival of Jersey hybrids of 89,77% and a maximum number of discarded calves at birth up to 15 days of age (5,68%), followed by 3,40% and 1.14% over 15-30 days and 30-60 days. Van Pelt *et al.,* (2012) reported that the survival rate was 97,5% from 15-180 days in dairy calves raised for veal. Norberg *et al.* (2013) showed that the rate of postpartum elimination increased to 12.53% within the first 180 days of milk calves. Chaudhary *et al.,* (2013) reported a calf mortality rate of 21,53%, followed by 9,35% silkworm calves and 4,37% adult cows. Among the 3 age groups, calves had the highest rate of elimination (16.09%) due to poor management, followed by 2,48% of cases of gastrointestinal diseases. Mishra *et al.,* (2015) reported that the overall mortality rates in the 1-3 and 3-6 month age groups were 3,61% and 2,41% respectively and these values were 3.14% and 1.64% hungry for male and female calves, respectively. The highest mortality rate (5.44%) was observed within 1 month postpartum in both sexes (Mishra *et al.,* 2015). They argue that the 0-1 month age period is the most important period of the calf's life and after this period, the calf's chances of survival are maximized. Kharkar *et al.,* (2017) reported an overall

mortality rate of 31.22%, with the maximum rate (15.12%) of calves discarded within the first month in Jersey x Sahiwal hybrid calves. Furthermore, they observed that the overall mortality in the 1-3 months, 3-6 months, and 6-12 months groups was 5,75% (7,06% in male calves and 4.49% in female calves) and 7.06% in female calves and 5.06% in female calves).

The eliminated rate of calves is a multifunctional issue, the management of herds, mother cows and the season have an impact. The main causes of calf waste can be classified as contagious and non-infectious. Infectious causes are diarrhea and pneumonia caused by bacteria, viruses and protozoa. The main non-infectious causes are reproductive disorders, improper colostrum feeding, low weight calves, and poor management practices. Dystocia is the main cause of the rate of calf rejection and about 50% of the rate of calf rejection occurs due to reproductive disorders. McCorquodale *et al.,* (2013) reported that the two most common diseases affecting calves are diarrhea and respiratory disease. Torsein *et al.,* (2011) also reported that gastrointestinal disorders and pneumonia are the two main causes of calf mortality in the first month of life and that these causes are influenced by the conditions of the stables, the amount of colostrum and the way calves are fed. Rao and Nagarcenkar (1980) observed that the highest percentage of discarded calves was due to respiratory diseases from birth to 1 month of age in hybrid cattle while diseases affecting the digestive system resulted in more deaths in the group of 3 to 6 months of age. Islam *et al.,* (2005) observed that pneumonia is the main cause of death in calves. Causes of maximum calf rejection due to abdominal distension accounted for 1,36%, followed by sepsis (0,83%) and hepatitis (0,80%). They argue that the necessary and timely intake of colostrum for newborn calves will lead to lower rates of disposal. Balvir *et al.,* (2009) observed that gastroenteritis (7,30%) is the main cause of death, followed by pneumonia and other diseases. Mishra *et al.,* (2015) reported that the maximum rate of elimination in calves was due to gastroenteritis (6,18%), caused by a bacterial or viral infection, or by delayed colostrum feeding. In this study, pneumonia was the second most important cause of calf mortality with 3,16%, followed by other causes (e.g. insufficient or delayed feeding of colostrum, treatment, worms, snake bites, etc.), resulting in 3,65%. Kharka *et al.,* (2017) reported that the highest rejection rates in calves were due to gastroenteritis (32,81%), followed by pneumonia (18.75%), other (15,63%) and sepsis (12,50%) in Jersey x Sahiwal hybrids. Pathak *et al.,* (2018) also reported that the highest mortality was attributed to gastroenteritis/diarrhea (43,26%), followed by respiratory disease (mainly pneumonia) (22,74%), birth/preterm birth defects (10,87%), gastrointestinal (bloating) disorders (6,04%), trauma/accident (5,63%) and other diseases (16,70%) in Jersey hybrids.

CONCLUSION

The gestation period of Holstein Friesian cows when artificially inseminated with Wagyu bull semen has an average duration of 283.29 days with the earliest cows at 275 days and the latest cows at 290 days with the rate of female calves being born at 53.55% and male calves being born at 46.45%. The time from childbirth to estrus is 95.54 days while the time from childbirth to pregnancy is 131.13 days.

The birth weight of the average male calf herd is 34.4 kg; the female calf is 32.6 kg. At this stage, the male calves weigh 104 kg with an average weight gain of 773.22 grams/head/day and the female calves are 99.98 kg with an average weight gain of 748.66 grams/head/day.

With the number of calves born mainly suffering from several diseases such as FMD accounts for 0%, pasteurellosis accounts for 2.18%, tick born disease accounts for 3.82%, diarrhea

accounts for 11.4%, pneumonia accounts for 5.46%, osteoarthritis accounts for 1.09%, LSD accounts for 0% and pink-eye accounts for 3.28% and the male calves are eliminated is 7, accounting for 3.28% and the female calves are eliminated is 4, accounting for 2.18% with the total number of difficult births is 7.10%.

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