

The economic effect of abortion on first calving Holstein cows

El efecto económico causado por aborto en vacas Holstein de primer parto

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ABSTRACT

Bovine abortion is defined as the gestation product loss at an age between 42 and 260 days and not only is reduced to the product loss, it is considered as a limiting factor of livestock development due to the economic losses it generates in the system in replacement heifers. The objective of this research was to estimate the abortion economic effect in first calving Holstein cows, therefore an observational study was carried out in a population of 1,666 Holstein dairy cows. According to the results obtained, a total of 337 abortions were registered during the study period, which were classified according to the gestation period, highlighting the registration of the second third of gestation with 220 abortions, followed by the registration of the first third of gestation with 61 abortions, ending the last third of gestation 56 abortions. When carrying out the economic evaluation, the unit costs of production in the insemination and gestation process that originated an abortion were investigated, which are around \$ 25,360.00 pesos, which gives rise to a financial projection considering a population of 500,000 Holstein dairy cows in the Lagunera region. and approximately 20% are first calving heifers, originating a population of 100,000 first calving heifers, of which about 20% of this population produces abortions, which causes an average of 20,000 abortions per year that generate economic losses of approximately \$ 690'616,023.70 pesos per year for the livestock sector of the region.

Keywords: abortion, pregnancy, production, replacement.

RESUMEN

El aborto bovino se define como la pérdida del producto de la gestación a una edad entre los 42 y 260 días y no solo se reduce a la pérdida del producto, se considera como un factor limitante del desarrollo ganadero por las pérdidas económicas que genera en el sistema en vaquillas de reemplazo. La presente investigación tuvo como objetivo estimar el efecto económico que tiene el aborto en vacas Holstein de primer parto, por lo que se realizó un estudio observacional en una población de 1,666 vacas lecheras de raza Holstein. De acuerdo a los resultados obtenidos se registraron un total de 337 abortos durante el periodo de estudio, los cuales se clasificaron de acuerdo al periodo de gestación, destacando el registro del Segundo tercio de gestación con 220 abortos, seguido por el registro del primer tercio de gestación con 61 abortos, finalizando el tercer tercio de gestación 56 abortos. Al realizar la evaluación económica se investigaron los costos unitarios de producción en el proceso de inseminación y gestación que origina un aborto los cuales son alrededor de \$25,360.00 pesos lo que da origen a una proyección financiera considerando una población de 500,000 vacas lecheras Holstein en la Comarca Lagunera y aproximadamente el 20 % son vaquillas de primer parto originando una población de 100,000 vaquillas de primer parto, de las cuales cerca de un 20% de esta población produce abortos lo que ocasiona un promedio de 20,000 abortos por año que generan pérdidas económicas aproximadas al \$ 690,616,023.70 pesos por año para el sector ganadero de la región.

Palabras clave: aborto, gestación, producción, reemplazo.

INTRODUCTION

Bovine abortion is defined as the gestation product loss at an age between 42 and 260 days, loss before 42 days is considered as embryonic reabsorption and after 260 days it is considered as premature delivery (Ojeda, 2013). The phenomenon of abortion is not only reduced to the product loss, it is considered to be a limiting factor in livestock development due to the economic losses it generates in the system (Benavides *et al.*, 2010). Because of abortion, in addition to causing the direct loss of the calf, often leads to the loss of the cow or heifer, and it is the cause of other losses that are not estimated by the producer, but that affect him economically; also affecting reproduction, since it causes the period of open days and the interval between calvings to be too long (Romero, 2008).

In a dairy herd, an incidence of approximately 10% is accepted as normal, but if it exceeds this limit, it may be in the presence of an outbreak or an abortion storm (Ronda, 2012). Abortions are more commonly observed during the second half of gestation, in the matter of abortions that occur during the first half of gestation they are not detected by the producer and the cow is clonically treated as repeater or subfertile (Campero, 2003).

In Mexico, it is estimated that the causes of abortions remain unknown more than 70% of the time (Meléndez *et al.*, 2010); abortion percentage caused by infectious etiology is estimated at 40-60% of the total (Conigliario, 1997). It is also important to note that more than 50% of abortion episodes are of unknown etiology, only 30 to 50% of reported abortions have an accurate diagnosis and of these 90% are due to infectious agents (Amenábar, 2008). Among the infectious diseases of bovines, protozoa, bacteria, viruses, chlamydia, mycoplasmas and fungi are identified; while the non-infectious causes we have environmental, nutritional, toxic, genetic and traumatic (Trabatoni, 2011).

Problems of infectious or non-infectious etiology that interrupt pregnancy cause great economic losses, so it is essential to identify the causes that produce reproductive failures, which allow effective control to be exercised (Aristizábal, 2008). On the other hand, livestock production cost is defined as the value of economic material set and time goods that a livestock producer uses to obtain a specific product, in this case it is the calf. Production costs in livestock are affected by global economic changes, this has caused production costs to have a high variability between each production cycle, affecting activity profitability Trejo *et al.*, 2010).

The implicit effect of costs is the losses on production produced by the Abortion Syndrome in Bovines; they must be fully identified, since they not only correspond to calf potential loss, but also to all the actions that had to be carried out to achieve

gestation in the cow; such as: semen expenditure, personnel, food, space occupied in infrastructure, etc. In addition, the productive losses of future unrealized milk production should be considered, as a consequence of the lengthening of the period between parturitions; in addition to sequelae such as infertility or early post-abortion embryonic loss and lengthening of the generation interval.

The economic losses caused by bovine abortion have been studied with different values in which the value of abortion has been estimated, as in California at 640 US dollars, although other authors value it between 600 and 800 US dollars ([Gädicke et al., 2008](#)). In some regions of the Comarca Lagunera, in Durango State, estimates have been made of losses caused by abortions. In 1998, the Technical Committee on Bovine Abortion estimated that only by feeding, reduction of milk production, medicines, semen and the loss of replacement, the cost of abortion in first calving cows was \$ 10,684.20 pesos and 12,249.60 pesos if the abortion affected cows with more than two calvings ([Romero, 2012](#)).

On the other hand, the federal government in Mexico has developed strategies to increase the replacement of calves, and reports that in 2013 dairy cattle has had a slightly upward behavior, going from 2.3 million in 2008 to 2.4 million in 2013; and identifies a problem in the livestock subsector, such as "the low production of the main foods of livestock producers in livestock economic units"; causing low productivity of LEUs, which originates from the product transformation process, where the inventory of productive bellies and replacement females in cattle herds is low. For this reason, in the Sectorial Program for Small Agricultural and Food Development 2013-2018, it establishes as a specific central objective, which "the production of the main foods of livestock producers in livestock economic units is increased" and in objective 9 it establishes that the inventory of productive bellies and replacement females in livestock herds should be increased ([SAGARPA, 2017](#)).

The objective of the present work was to estimate the economic effect caused by abortions in first calving Holstein cows.

MATERIAL AND METHODS

The study was conducted from January 14, 2018 to November 30, 2018, in a dairy farm in Torreón Coahuila municipality, Mexico; which is located in a semi-desert region of northern Mexico, at a height of 1140 meters above sea level, between the parallels 25° 30' and 25° 45' and the meridians 103° 20' and 103° 40' ([INEGI, 2009](#)).

Experimental group

An observational registration study of 1666 first calving heifers of the Holstein breed was carried out, recording the insemination service dates and classifying the development of the gestation stage; in addition to observing the stage of pregnancy in

which the abortion occurred. The record of the costs involved in abortions in first calving cows was from January 1 to November 30, 2018.

The variables that were considered to estimate the economic effect caused by abortions in first calving Holstein cows were: semen, feeding of the cow during gestation, technical insemination services and cost of the calf.

RESULTS AND DISCUSSION

The results obtained were 337 abortions, from a population of 1,666 Holstein cows; which represents approximately 20% of the heifer population; abortions were recorded for 11 months in the field work (Table 1), registering that the month of July is where the highest number of abortions occurred. Scientific evidence regarding the time of year is based primarily on heat stress on the fetus viability. There is a higher abortion incidence when inseminated in summer, in relation to when it is done in winter; and there are no marked differences in autumn and spring ([Ronda, 2012](#)).

Table 1. Monthly registry of abortions 2018

Month	Number of abortions
January	42
February	37
March	42
April	20
May	37
June	23
July	47
August	23
September	25
October	27
November	14
Total	337

According to the gestation stage (Table 2), it was observed that the greatest amount of them occurs in the second third. Losses can occur at different stages of the reproductive cycle, namely: conception failures, embryo mortality, abortions and peripartum mortality ([Campero, 2003](#)).

Table 2. Number of abortions by gestation stage in first calving cows

Stage	First third of pregnancy	Second third of pregnancy	The last third of pregnancy	Total
Number of abortions	61	220	56	337

Gestational losses can occur in different stages, in the egg (from conception to maternal recognition), embryo (maternal recognition until the end of the differentiation period), or fetus (from day 42 to 260). Losses that are generated after day 260 are

considered premature births, since the calf would be able to survive outside the uterus (Gädicke *Op cit.*, 2008). Regarding production losses in relation to gestation and services by conception that heifers require to become pregnant again, it involves an increase in time (months), to be able to start producing. This increases costs, since services increase, according to (Hidrogo *et al.*, 2014), services per conception in heifers vary from 1.1 to 1.2.

To develop a financial picture, it is necessary to record the main expenses incurred during the insemination and gestation process in first calving cows (Table 3).

Table 3. Economic effect caused by abortion in first calving Holstein cows

Costs	Abortions			
	Unit Costs in pesos	First third of lactation	Second third of lactation	Last third of lactation
Cow age/first calving	13 months	16 months	19 months	22 months
		61	220	56
Technical. Serv	800	48,800	176000	44800
Material/ Inseminate	300	18,300	66000	16800
Cum (semen) (Straw)	660	40,260	145200	36960
Feed/month/cow \$1,200				
Feed cost/cow/ No. abortion	15,600	19,200	22,800	26,400
Calf cost	8,000	1'171,200	5'016,000	1'478,400
Total	25,360	1'785,760	7'186,000	2'665,120
Total expenses/year/337 abortions				11'636,880

The calculated value of \$ 25,360.00 pesos per abortion at present is higher than that found by Thurmond *et al.*, (1990), which indicate an annual loss of 640 dollars (\$ 14,080) per abortion, Kirk (2006); mentioned by (Tulu, 2018), pointed out that late abortions (after 200 days of gestation), have an estimated cost between 500 to 900 USD per case, which frequently results in an early elimination of the cow, and means an additional loss of more than \$ 1,000. Once the economic cost caused by the abortions of first calving heifers has been identified and calculated and according to Guerra *et al.*, (1994), an administrative process that can benefit small and medium livestock producers is established, originated by the identification and definition the problem that produces large economic losses; and to date it is an ant expense, where the producer hardly quantifies it due to ignorance or concealment of information, and considers that it is the responsibility of the company's management to generate a coordinated economic plan, which allows minimizing and controlling the economic expenses caused by abortions.

CONCLUSIONS

According to the results obtained, it allows to conclude that the number of abortions, regardless of the lactation phase per year, amounts to approximately 20% of the population of the barn and considering the production costs involved in the service per conception, it amounts to \$ 25,360.00 pesos, which generates an economic loss for the producer. For this reason, it is suggested to prepare a registry of control of the incidence of abortions, where the largest number of variables involved are established, such as type of abortion and semen, history of the cow, vaccination schedule, etc; in addition to recording the pathological findings of the fetuses. With respect to the objective, it is fulfilled, by estimating the economic effect caused by abortions in Holstein cows of first calving. In the case of Comarca Lagunera region, there is an approximate census of 500,000 head of dairy cattle in production, it is projected that approximately 20% producing a population of 100,000 first calving heifers, of which about 20% of this population produces abortions, which causes an average of 20,000 abortions per year. When considering the costs obtained in the research, an economic cost of \$ 690,616,023.70 per year is projected, which has a negative economic effect for the producer, as it is an expense that few producers observe due to lack of control, and becomes an area of opportunity for future research.

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