LATE EMBYRONIC LOSSES IDENTIFIED BY ULTRASONAGRAPHY ON FOUR DAIRY FARMS FROM TRINIDAD

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ABSTRACT

Embryonic mortality in dairy cattle results in lower pregnancy rates, slower genetic improvement and financial losses to the dairy farmer. The incidence of late embryonic mortality (day 30-60) was investigated at four dairy cattle farms in Trinidad. Eighty seven animals exhibiting either natural oestrus or induced oestrus, respectively, were inseminated either artificially (AI) (n=25) or using a Fixed time AI protocol (n=62). Pregnancy diagnosis (PD) was carried out using real time ultrasonography at day 25-30 and subsequently at day 60. At day 25-30, and at day 60, respectively, using AI, 21 of 25 and 21of 21 animals from natural estrus were diagnosed as pregnant. At day 25-30 and at day 60, respectively, using FTAI, 40 of 62 and 36 of 40 animals from induced estrus were diagnosed as pregnant. Of the 61 animals diagnosed pregnant at day 25-30, only 6.5% (4 of 61) of late embryonic mortality was recorded at day 60. The incidence of embryonic mortality was independent of farm, oestrus type and physiological stage (chi square P> 0.05). The presence of low embryonic mortality existing on these farms was probably due good management.

INTRODUCTION

Embryonic mortality (EM) is regarded as one of the causes of reproductive failure in cattle resulting in reduced pregnancy rates, slower genetic improvement and substantial financial losses to dairy production. Embryonic mortality refers to the embryo deaths or losses which occur in the period between fertilization and the completion of the stage of differentiation at approximately day 42 (Hafez 1987). Embryonic mortality can occur for many reasons including, poor quality of the oocyte (impaired follicular development, delayed ovulation), disrupted and abnormal fertilization, embryonic chromosomal abnormalities, unfavourable changes in the uterine environment (endometritis, increased blood urea levels), diseases inducing fever, heat stress, inadequate progesterone levels inducing impaired luteal function and increased metabolism of progesterone in highly producing dairy cows, precocious luteolysis and the direct effect of some infectious agents (Micheal 2006). The timing of the embryonic loss is important and can have different effects on the level of production of a dairy farming enterprise. Embryonic mortality is divided into early embryonic mortality and late embryonic mortality (Hafez 1987). Early Embryonic Mortality occurs before day 15 post artificial insemination (AI) whereas late Embryonic Mortality occurs between 16 and 45 days post AI.

Sandy and Clunis unpublished data, (2008), in a 10 year review of records (1998-2008) on the reproductive performance of the Eastern Caribbean Institute of Agriculture and Forestry (ECIAF) dairy herd from Trinidad found that pregnancy rate was estimated to be about 4.1% while the conception rate was averaged to be 17.7%. They also suggested that a major contributing factor to these findings was poor heat detection rate (HDR) which was reported to be 23.2%. Poor heat detection rate (HDR) is influenced by factors such as missed heats, the inability of the stockmen to pick up signs of estrus and lack of absence of estrus shown in certain animals. No withstanding, embryonic mortality can contribute to poor HDR as temporarily pregnant animals will not cycle nor show signs of heat. If these latter animals succumb to embryonic mortality before day 60 and are detected open at day 60 from pregnancy diagnosis (PD), then it can be erroneously assumed that the animals were never pregnant.

The general objective of this study was to determine whether or not embryonic mortality is a major contributor to the poor infertility in dairy cattle industry in Trinidad. The specific objective of the project included:

- To identify the rate of embryonic mortality on four selected farms in Trinidad.
- To determine if embryonic mortality rate varies within regions/ farms.
- To determine if there is any variation in embryonic mortality between cows and heifers.
- To determine the effect BCS on embryonic mortality

MATERIALS AND METHODS

Farms

Four target semi intensively managed farms were randomly selected from county St George East and Caroni Central. These farms included the Aripo livestock station (ALS), the farm located at The Eastern Caribbean Institute of Agriculture and Forestry (ECIAF), a farm located in the Caroni Carlsen Field dairy farm and a farm located in the JS Waller Field area. At mornings and at the four farms, animals are gathered from pastures and drawn into milking sanctions where they are milked using a semi-automatic system. Pastures comprised mainly tanner grass (*Brachiaria mutica*) and local bamboo grass (*Paspalum fasiculatum*) and elephant grass (*pennesetum purpureum*). At around mid day (12 – 1 o clock) the animals are re-collected and milked once again. These activities occur daily. These animals were only fed concentrate during times of milking (twice daily) and growing animals (in 'beef lot') are fed concentrate once daily, along with forages. Daily milk yield were in the vicinity of 4 to 12 kg per day.

Animals

Animals for the study were categorized into two groups these four farms based on their physiological states. Animals for natural breeding, (n=25) were selected presumptuously based on their early stages of pregnancy confirmed by pregnancy diagnosis, after subjection to natural mating. The remaining animals (n=62) were selected while they were still open and subsequently synchronized. To synchronize these latter animals a timed artificial insemination protocol (TAIP) was used. At day zero a controlled releasing device (CIDR) containing 1.4g progesterone was inserted intravaginally, then at day seven the CIDR was removed. The animals were subsequently given an intramuscular injection of PGF2 alpha (12.5 mg im dinoprost tromethamine). Forty eight hours afterwards an intramuscular injection of estrogen (2.0 mg im estradiol benzoate) was administered. The animals were then inseminated (AI) twenty four hours afterwards.

Ultrasonagraphy

As the animals reach 25-30days into their expected pregnancy an ultrasound was used to determine if they were indeed pregnant or not. If the animals were determined to be pregnant another ultrasound was done at day 60 to determine if they were still pregnant.

RESULTS AND DISCUSSION

The number of animals pregnant at day 25 pertaining to natural estrus

The following bar chart shows the total number of animals that were bred by natural estrus. It then divides the data into two groups the smaller group of 16.6% (4 of 25) are the animals that were bred by natural estrus but did not prove to be pregnant at day 25. The larger portion of the graph which is 83.3% (21 of 25) indicated the animals that were bred by natural estrus and were detected as being pregnant at day 25
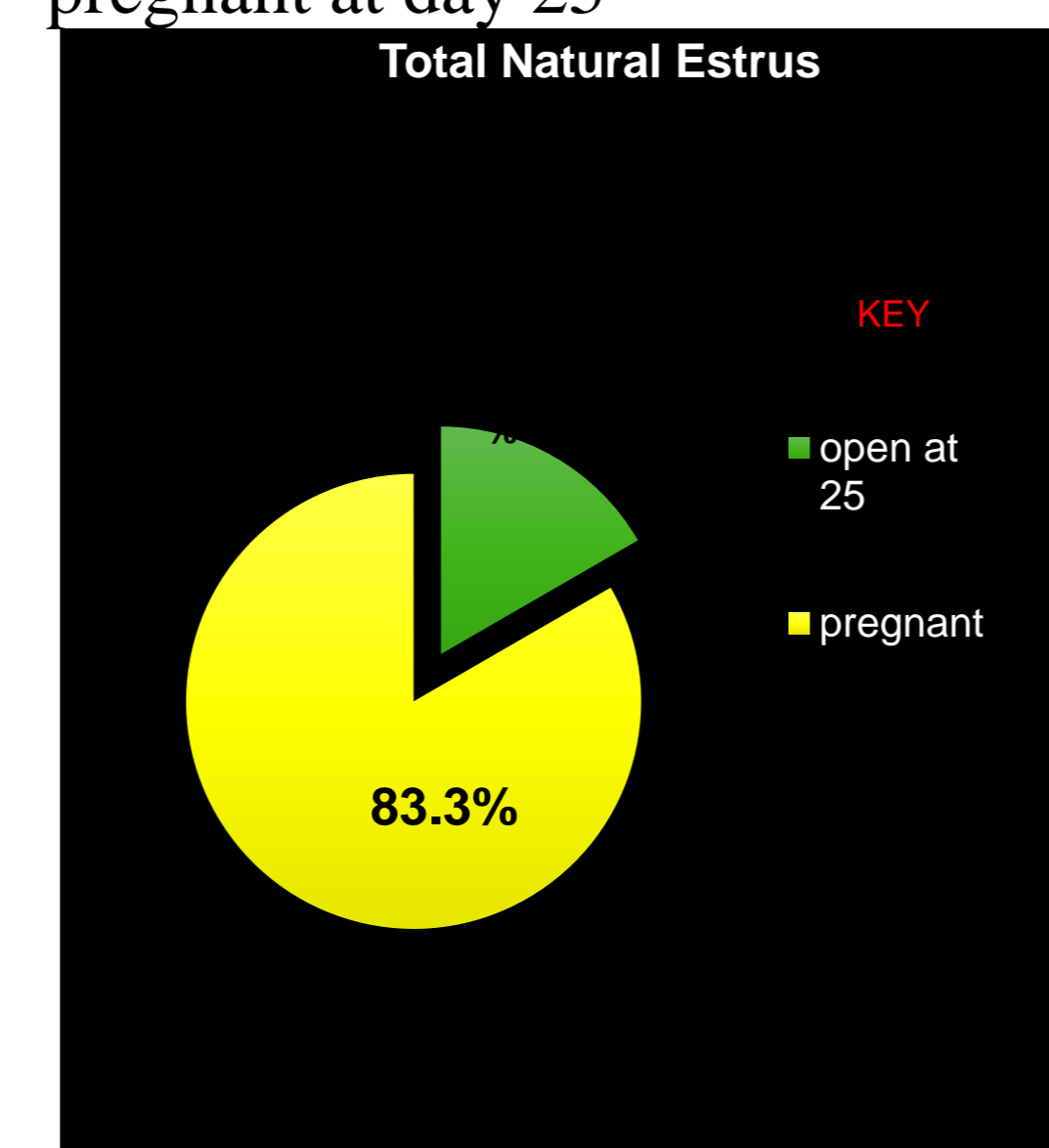

Figure 1: Percent of percent of naturally serviced animals open or pregnant
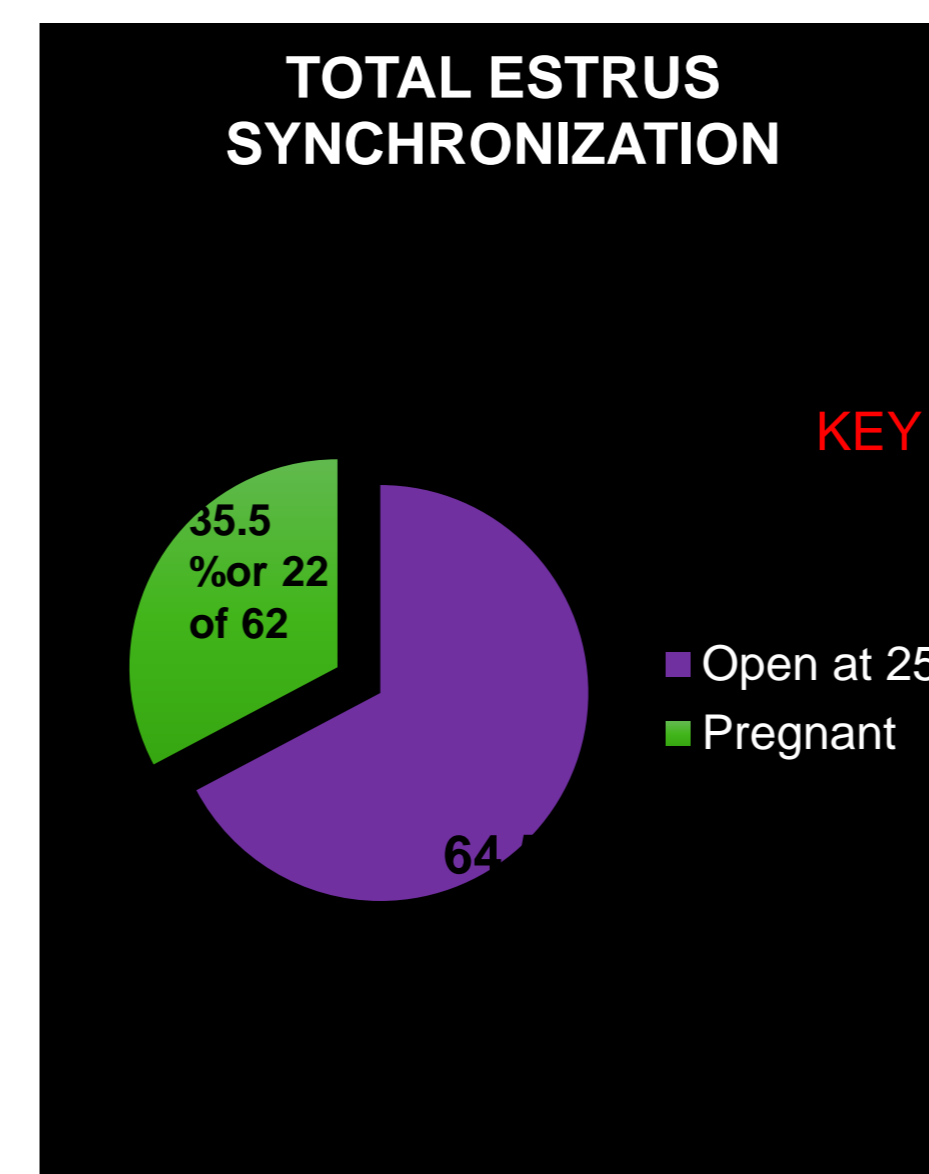

Figure 2 Percent of estrus synchronised animals pregnant at day 25

Estrus synchronised animals that proved to be pregnant by day 25

The following bar chart shows the total number of animals that were bred by the timed artificial insemination protocol. The data was then divided into two groups the smaller group of 32.7% are the animals that were bred by the timed artificial insemination protocol but did not prove to be pregnant at day 25. The larger portion of the graph which was 83.3% (or 40 of 62) indicated the animals that were bred by the timed artificial insemination protocol, detected as being pregnant at day 25.

At day 25-30 and at day 60, respectively, using FTAI, 40 of 62 and 36 of 40 animals from induced estrus were diagnosed as pregnant.

RESULTS AND DISCUSSION

Total embryonic deaths

The following table shows the total number of animals that succumbed from embryonic mortality compared to the number of unaffected animals. The data showed that four animals (6.5%) succumbed to embryonic mortality while fifty seven animals (93.4%) did not succumb to this condition
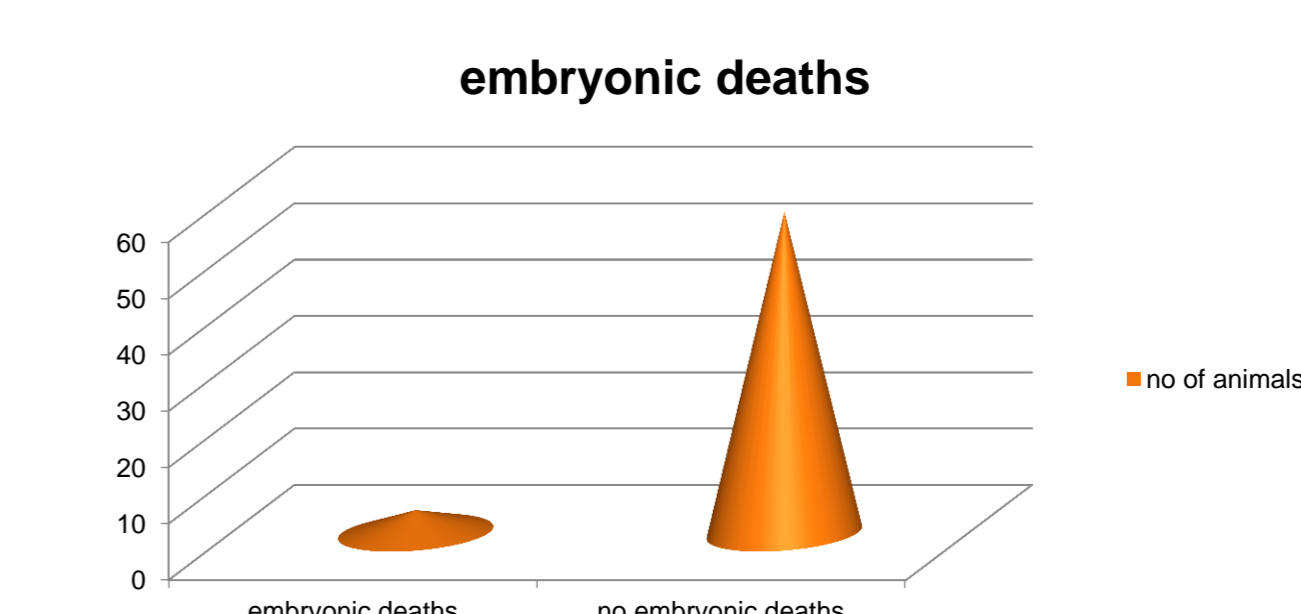

Figure 3: Number of embryonic deaths

Embryonic mortality based on farm location

The results showed that p> 0.05, this in essence means that embryonic mortality was independent of farm location. This can be due to the fact that the management operations of each farm may have been similar since all animals may be reared in the same semi intensive system and may have had access to similar nutrients in their diet. Heat stress can also play an important role in embryonic mortality

TABLE 1: This table shows the occurrence of embryonic mortality based on the location of the farm. P=0.357 > 0.05

OBSERVED DATA	ECIAF	ARIPO	J.S DAIRY	LONDON FARM
Total	25	10	17	9
Embryonic mortality	3	1	0	0
	22	9	17	9

Embryonic mortality based on estrus type

The data shows that p > 0.05, which meant that embryonic mortality was independent of estrus type. Results were similar whether the animal was bred by natural estrus or by the TAIP.

TABLE 2: This table shows the occurrence of embryonic mortality based on the type of oestrus.

Embryonic death from day 25 to day 60	0	4
Embryos surviving at day 60	21	36

Embryonic mortality based on physiological state

The data showed that p>0.05, this meant that embryonic mortality was independent of the physiological state of the animal. Whether the animal was bred for the first time or if the animal was being bred for the second or third time they still had an equal chance of succumbing to embryonic mortality.

TABLE 3: This table shows the occurrence of embryonic mortality based on the physiological stage of the animal. P>0.05

OBSERVED DATA	COW	HEIFER
Total	46	15
Embryonic death	3	1

CONCLUSION

Embryonic mortality does occur on farms in Trinidad. The study showed that four out of the sixty one animals in the study succumbed to embryonic mortality. Embryonic mortality was independent of factors such as the location of the farm, the physiological state of the animal and the type of estrus they were bred too.