

EXPERIENCES IN ARTIFICIAL INSEMINATION OF BEEF CATTLE IN NORTH QUEENSLAND

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Summary

Artificial insemination was used in an attempt to breed three groups of Brahman cross cows on two properties in north Queensland. On one property the attempt was abandoned due to low incidence of detected oestrus in lactating cows. On the other property calving rates following insemination were 20.8% and 16.4% over two years. Vibriosis was one cause of low fertility. Semen was collected satisfactorily from properly prepared Santa Gertrudis bulls using an artificial vagina. Electroejaculation proved unreliable. The results are discussed in terms of the problems associated with artificial insemination of beef cattle.

I. INTRODUCTION

Although artificial insemination is widely used in the dairy industry, it has found very limited application in beef cattle. It has considerable potential value for the control of vibriosis which is present in North Queensland beef herds (Donaldson 1962; Donaldson et *al.* 1964) and for genetic improvement by the widespread use of selected sires. These investigations were carried out on two properties in coastal north Queensland to investigate some problems limiting the use of artificial insemination in beef cattle.

II. MATERIALS AND METHODS

(a) Properties

One property (A) was in an area with an annual rainfall of 60 in., and the other (B) was in an area of 30 in. annual rainfall. Investigations were carried out between April and June in 1958 and 1959 on Property A, and in March 1959, on Property B.

(b) Animals

On property A in 1958, 128 Brahman crossbred heifers aged two years were used. In 1959 a total of 227 animals were involved. These consisted of 130 two-year old heifers, 35 non-lactating cows (aged three years and older) and 62 lactating cows. The lactating cows were three years old and older and had 6-12 week old calves at foot.

On property B, 230 Brahman x Shorthorn cows were used, made up of 194 lactating cows (with calves aged 4-12 weeks) and 36 non-lactating heifers.

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(c) Detection of Oestrus

On property A, the cows were pastured in a small well-grassed paddock adjacent to the cattle yards. About 7 a.m. and 4 p.m. they were mustered into the yards and oestrus was detected, using vasectomized bulls. Cows served were cut out of the mob on horseback into a smaller yard. Oestrus observations were made for 43 days in 1958 and 47 days in 1959.

At the commencement of the 1959 experiment, only 150 of the 227 cows were yarded for oestrus detection. This was to conserve fodder and facilitate handling. As cows were inseminated, they were transferred to another paddock for 14 days before being returned to the oestrous detection mob. As cows were inseminated and removed, they were replaced by new cows until the whole 227 animals were observed.

On property B, the cows were pastured in a paddock 1 sq. mile in area. This paddock had been **unstocked** during the wet season and was well-grassed. For 11 days the cows were mustered twice a day into cattle yards and oestrus was detected using steers, some of which were previously implanted with 100 mg testosterone propionate.

(d) Fertility Rates

Pregnancy rate was assessed on property A in 1958 by rectal examination three months after insemination. The number of cows that calved was also recorded. All cows that were pregnant at the pregnancy test in 1958 and did not calve were tested for brucellosis (serum agglutination) and vibriosis (vaginal mucus agglutination, VMA). In 1959, 30-day non-return to oestrus after first insemination was determined in 80% of the cows on property A. No pregnancy test was made but the number of calves produced was recorded.

(e) Treatment for Vibriosis

In 1959 on property A, all cows were to be treated prophylactically for vibriosis with an intrauterine infusion of 1 g streptomycin sulphate and 40 ml of a 33⅓% solution of sodium sulphamezathine. Treatment was given when cows were detected in oestrus. These treatments were discontinued after May 19, 1959, because the return rate was unsatisfactorily high and because of the possibility that treatment shortly before insemination might be interfering with fertility.

(f) Collection and Processing of Semen

On property A in 1958, semen was collected by electroejaculation from Santa Gertrudis bulls. Semen was collected every third day using a 6V vibrator-operated power unit (Blackshaw 1954). The stimulus was applied through a bipolar rectal electrode at an initial level of 20V.

In 1959, semen was collected from the same Santa Gertrudis bulls in the same way. In addition, semen was collected from a Santa Gertrudis bull using an artificial vagina.

On property B, three young Santa Gertrudis bulls were trained for collection with an artificial vagina.

All semen collected was evaluated for colour, density and motility, and diluted and chilled in an egg yolk-citrate diluter. Semen quality was judged to be satisfactory if of good colour, high density and if more than 70% of spermatozoa appeared motile.

(g) Insemination Of Cows

In 1958, cows were inseminated as soon as they were detected in oestrus and if still in oestrus were inseminated again at the following muster. In 1959, cows detected in the morning were inseminated that afternoon and cows detected in the afternoon were inseminated the following morning.

III. RESULTS AND DISCUSSION

(a) Property A

(i) Collection of semen

A satisfactory semen collection was made using the artificial vagina on all 23 attempts. Semen was obtained at 28 out of 41 attempts using the electroejaculator. Massage of the ampullae and seminal vesicles was successful following unsuccessful electroejaculation on five occasions. Semen quality was satisfactory.

(ii) Detection of oestrus

In 1958, 124 heifers (96.7%) were detected in oestrus in the 43 day period. In 1959, 113 heifers (86.9%), 31 non-lactating cows (88.6%) and 23 lactating cows (37.1%) were detected. An average of 7.1 cows was detected each day for the first 21 days and 6.5 for the remaining 27 days. Eleven heifers were detected in oestrus once, 66 twice and 26 three times. The number of lactating and non-lactating cows detected once was 15 and 1; twice, 6 and 25; and three times 0 and 2 respectively.

(iii) Fertility

In 1958, 36 animals (29%) were pregnant on rectal examination in September but only 26 (20.8%) calves were born. All the ten heifers that lost calves between four months pregnant and term were positive to the VMA test for vibriosis and negative to the serum agglutination test for brucellosis. Of the 36 conceptions, 25 were to first insemination and 11 to second insemination, giving pregnancy rates of 20.1% and 15.9% to first and second inseminations respectively.

In 1959, 25 animals (16.4%) calved to artificial insemination but 11 females (7.2%) with a 30-day plus non-return to oestrus did not calve. Because of the limited duration of the programme, only 80% of the females were observed for 30 days following first insemination.

(iv) Treatment for Vibriosis

Fifty-three per cent of 35 cows treated for vibriosis calved, while only 16% of the 115 untreated cows calved ($P < 0.001$). Despite the confounding of treatments in time, this was an indication that treatment for vibriosis improved calving.

(b) Property B

The investigation was abandoned after 11 days because of the rapid deterioration in the body condition of lactating cows and the low incidence of detected oestrus in this class of cow. As previously reported (Donaldson 1962), only 43 (22%) of 194 lactating cows were detected in oestrus, whereas 25 (69%) of 36 non-lactating heifers were detected ($P < 0.001$). The loss in body condition resulted when the cows did not settle down and graze during the day between musterings.

It was not possible to collect semen from three Santa Gertrudis bulls aged 18 months when they were taken from the paddock. Both cows and steers were used as teasers. After three months stall feeding with daily handling and weekly attempts at collection, the bulls were collected from with an artificial vagina.

(c) General

The collection of semen under property conditions using an artificial vagina presented no serious problems when adequate preparations were made. Electro-ejaculation was uncertain and several times difficulty was experienced obtaining semen. This was not the experience of Watson (1964) using different electrical equipment.

Holding large numbers of cows for the detection of oestrus presented the major problems. It was necessary to hold cows because of the impracticability and costs of labour involved in watching the cows in the paddocks or at watering points and bringing the cows in oestrus into the yard. To overcome nutritional problems, the holding yard must contain sufficient high-quality feed or hand feeding must be practised. Vasectomized bulls were very effective in detecting oestrus but should be aproned to prevent the spread of genital diseases. Steers with or without testosterone implants and other cows were also satisfactory. The low incidence of oestrus in lactating beef cattle was previously reported (Donaldson 1962; Warnick 1963).

Calving rates were very low although conception rates may have been much higher. Reasons for this low calving rate are obscure but vibriosis infection was important. Such factors as management, semen fertility, temperament and other factors in the cow were not assessed.

IV. REFERENCES

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