STUDIES ON RETENTION OF AFTERBIRTH IN COWS

THESIS

Submitted to the Faculty of Veterinary Science
RAJENDRA AGRICULTURAL UNIVERSITY, BIHAR
in partial fulfilment of the requirements
for the degree of
MASTER OF SCIENCE (VETERINARY)
IN
GYNAECOLOGY AND OBSTETRICS

By

Birendra Kumar Singh
B. V. Sc. & A. H.
JUNIOR RESEARCH FELLOW, (R. A. U.)
Post-Graduate Department of Gynaecology and Obstetrics

BIHAR VETERINARY COLLEGE
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IN THE

MEMORY OF MY

LATE REVERED MOTHER

Dr. B.K. Singh,
B.V.Sc. & A.H. Hons., Gold Medalist,
M.V.Sc. (Madras), P.G.,Dr.Med.Vet.(Vienna),
Professor and Chairman,
Department of Gynaecology & Obstetrics,
Bihar Veterinary College,
PATNA.

PATNA,

Dated, the 7th February, 1977

This is to certify that the work embodied in this Thesis entitled "STUDIES ON RETENTION OF AFTERBIRTH IN COWS" is the bonafide work of Dr. Birendra Kumar Singh and was carried out under my guidance and supervision.

B K Singh.

(B. K. SINGH)

C E R T I F I C A T E

Certified that the research work incorporated in this Thesis have not been published in part or in full in any ~~other~~ journal.

(B. K. SINGH)

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(B. K. SINGH)

C O N T E N T S

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INTRODUCTION

I N T R O D U C T I O N

Dairy industry plays an important role in the upliftment of agriculture oriented rural economy of India. It ranks as one of the largest sources of income to the Indian farmers. The success of the dairy industry is totally dependent on the reproductive efficacy of dairy animals. Therefore the farmer attaches considerable importance to the breeding problems and disease condition connected with reproductive system.

Reproduction is the luxury function of the body. But for the cattle it is more important to bring them in calf and milk, because these are of paramount importance for the use of mankind since the beginning of human civilization. Our's being an agricultural country, depends mainly on bullocks for working power as well as inclines mainly on milk and milk products for its nutritive value. But average Indian due to his economic limitations is not in a position to have milk in proper amount in his daily diet. The average percapita consumption of milk is only 120 gm against the minimum recommended dose of 248 gm by Indian Council of Medical Research (Nambiar, 1976).

The problem of low productivity of our cattle is quite appalling due to poor nutrition and disease conditions by which our Indian cow yields only 175 kg of milk and Indian

buffaloe 440 kg of milk per annum (Nambiar, 1976). But in recent years cattle and dairy development have gained momentum. Government has launched massive programme. The Key Village Scheme and Intensive Cattle Development Projects (I.C.D.P.) which are meant to establish farms for superior germplasm, at the same time giving attention to breeding and effective disease control.

Reproductive inefficiency and genital diseases are quite rampant in our country and as such concerted efforts need be made to cope with these problems. There are many diseased conditions which are responsible for infertility and sterility of dairy cattle. Among them detained or delayed expulsion of placenta is one of the most important one. Detained or delayed expulsion of placenta is an indication for reproductive inefficiency and unsuccessful initiation and maintenance of normal lactation. Raker (1953) observed that following retention of placenta reproduction is usually affected and future breeding is often impaired. Gildow and Thorning (1953) reported that subsequent breeding following retention of placenta was not so efficient as that of preinfection, infertility being recorded in 40 per cent of cases.

Placenta and afterbirth are most often used synonymously but actually they differ from each other. Scientifically it is termed as placenta only when it is in functional stage whereas it is known as afterbirth when the foetus is expelled out and it becomes non-functional.

There are various causes for retention of after-birth. Of these infection of the uterus, dropsy of the fetal membranes uterine torsion, twinning, foetal giantism, primary or secondary uterine inertia, dystokia and other pathological conditions are some of the important ones, Fincher (1945), Kennedy (1947) and Palmer (1947). But whatever might be the causes of retention of placenta the treatment is two fold - (a) removal of the retained mass (b) maintenance of the future productivity. For this many methods have been recommended, from time to time. A survey of methods of treatment reveals a wide variation in techniques employed varying all the way from advocating early manual removal to no treatment at all. But commonly removal of retained mass is accomplished manually which was advocated by Burgess (1935), Williams (1943), Vandeplassche and Martens (1961), Ben-David (1962) and Luktuke and Choudhary (1965). For maintenance of future reproductivity antibacterial therapy with sulfonamides and antibiotics are most commonly used. But still the treatment of retained placenta is a therapeutic problem might be due to bacterial resistance to these drugs. The drug Furea bolus (S.K. & F. Ltd.) combines the nitrofurazone and proteolytic effect of urea. It was reported by Snyder et al. (1945) that nitrofurazone does not induce bacterial resistance and thus useful for the topical use.

Keeping in view the above noted facts the present investigation was designed to find out suitable treatment

for this condition. Three drugs namely Furea bolus, Oxytocin and Mifex were choosen for the treatment. Efficacy of the treatment was judged by the involution of uterus which was studied according to season, parity and treatment. The incidence of retained afterbirth was also recorded monthwise, seasonwise and sequencewise calving.

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REVIEW OF LITERATURE

REVIEW OF LITERATURE

EXPULSION OF THE FOETAL MEMBRANES.

Expulsion of placenta is a complex process. During the last few days of pregnancy, there is apparantly a beginning of degeneration of the epithelium of the maternal and foetal placentas with the birth of the foetus, the vessels in the foetal placenta collapse and the villi become small and shrunken. The uterus still contracts strongly after the expulsion of foetus. This is necessary to prevent haemorrhage and to aid in the expulsion of foetal membranes. These peristaltic and contraction waves besides reducing the size of the uterus and aiding inforcing the placental membranes into birth canal probably markedly reduce the amount of blood circulating in the endometrium. This causes a dilation or relaxation of maternal crypts. The shrinking of the villi and the dilation of the maternal caruncular crypts probably play a major role in the separation of foetal and maternal placentas. The middle uterine artery immediately contracts following parturition as the uterus contracts and the placenta is expelled.

Boyd (1950) stated that placenta should be expelled after four hours of calving in normal parturition and if it was retained onward he considered the calving to

be pathological.

Benesch and Wright (1951) stated that normally the placenta should come out within 12 hours after calving and if it was retained longer than 12 hours the condition was considered pathological.

Coid and McDiarmid (1954) considered the foetal membranes retained if complete expulsion did not occur within 72 hours after parturition.

Singh and Rao (1957) stated that if placenta comes out within 3 hours after calving , then only it can be called normal expulsion of placenta. If placenta comes out within 3 to 7 hours they termed it delayed expulsion of placenta and if placenta retained longer than 7 hours of calving they termed the condition retained foetal membrane.

The foetal membranes of cow are usually expelled within 4 to 5 hours after delivery of calf. If they are not expelled within 8 hours it is considered as retained placenta (Luktuke and Choudhary, 1965).

Robert (1976) reported that in normal physiological parturition the afterbirth of the cow falls away within 3 to 8 hours following calving. If the placenta is retained longer than 8 to 12 hours the condition is considered pathological.

INCIDENCE OF RETAINED PLACENTA.

Nairn (1935) noticed that retention of foetal membranes was commoner in dairy herds where suckling was not

allowed than in herds where the cows suckled as it was belived that with the suckling stimulus the tone of the uterus was better and mebranes were shed naturally.

Fincher (1941) stated the stimulating uterine contractions by injections of pituitrin immediately after calving apparently lowered the incidence of retained placenta as compared to non-treated controls.

Vinattieri et al. (1945) reported that separation of buffalo calves from the dams immediately afterbirth resulted in 22.7% of retention of afterbirth as compared to 4.9% in the same farms when suckling was allowed.

Coid and Mc Diarmid (1954) stated that the incidence of retained foetal membranes was 3.7% after first pregnancy in cows.

Desutter (1954) reported that retained placenta was observed in about 70% of dystokia cases due to uterine torsion and failure of cervical dilatation and in 25% of dystokia cases due to the oversize of the living foetus.

Singh and Rao (1957) reported 21.2% incidence of retained afterbirth in Red sindhi cows.

Erb et al. (1958) reported 5.4% incidence of retained placenta in primiparous and 25% incidence in pluriparous cows at 9th calving.

Bensch and Wright (1960) reported that the incidence of retained placenta was markedly high in births occurring several days before the expected date, because

placenta had not undergone the degeneration necessary for normal detachment.

Panichi (1964) stated that the incidence of retained placenta in cows was high in primiparous, decreased at 2nd and 3rd parturition and was highest at 4th parturition, incidence of retention in left horn was also higher than that in the right horn.

Brands (1966) reported that the retention of placenta was more common in primiparous than in the multiparous cows and the incidence was reported to be 5.1%.

Shipilov (1966) studied the incidence of retained placenta in two different farms. In one farm he observed only one case of retained placenta where the cows were given regular exercise for 1½ to 3 hours during the winter housing period compared to 15 cases of retained placenta in other farm where the cows were not given exercise. He further reported that the occurrence of first heat and involution of uterus was quicker in exercised cows compared to stallfed cows.

Muller (1974) recorded the incidence of retained placenta to be 7.7% in Holstein Friesian cows with single birth. He further stated that incidence was lower in August to November compared with other months.

BLOOD CALCIUM LEVEL AND THE RETENTION OF AFTERBIRTH.

Normal composition of the body fluids and efficient

circulation have been found to be essential for normal structure and function of all the physiological system. In diseased condition therefore, careful considerations must be given to variations in the blood composition.

Greig (1935) found that in several cases of retained placenta the uterus was too much flaccid and atonic due to low blood calcium level immediately after calving.

Kennedy (1947) studied the calcium level of blood in 20 cases of retained placenta after 12 hours of calving and found it to be 7 to 13.1 mg per 100 ml of blood.

Flegmatov and Shipilov (1961) reported the incidence of retained placenta with low blood calcium level (8 to 10 mg per 100 ml of blood).

TREATMENT OF RETENTION OF AFTERBIRTH.

Manual removal of retained placenta in the cow is practiced by most veterinarians because the diseased macerating foetal membranes are serving no good purpose and the farmer desires and expects the veterinarians to remove this unsightly foetid mass from genital tract. But there are different schools of opinion as to the time when the retained afterbirth should be removed.

The general experience among English Veterinary Surgeons in the past has been that attempts at removal during the first 48 hours are usually unsuccessful, for the placenta

is often firmly adherent and vigorous attempts at detachment may be accompanied by haemorrhage by accidental removal of caruncles. Moreover, the apical parts of the gravid cornua are usually at this time beyond the reach of the hand. For these reasons it was suggested that manual interference should be made after 3rd or 4th day by which time considerable putrefactive liquifaction has occurred and separation of the placental villi from the maternal crypts becomes easier. But it was observed that if the placenta was left for 3 to 5 days the animal becomes ill and even dies. Therefore, Albrechtsen (1917) opined that most rational treatment, one that leads to most prompt and complete recovery in case of retained placenta was the manual removal at an fairly early stage.

Burgess (1935) pleaded to remove placenta manually at a fairly early stage.

Erismann (1937) considered that careful manual detachment was the best form of treatment of retained placenta and had no harm even if the placenta was removed manually between 12 and 24 hours, or after 24 hours.

Götize (1941) stated that gentle detachment of retained placenta manually was justified at all times, though he preferred early detachment as puerperal infection and intoxication had not developed earlier.

Williams (1943) stated that it was highly desirable to remove all the foetal membranes after 24 hours of parturition and not to leave remnants in the uterus to act as foci of infection.

Gould (1944) reported that removal of foetal membranes should be considered a highly skilled operation, fraught with danger to the life of dam and with definite danger to reproduction.

Boyd (1950) stated that if placenta was retained fore more than ten to twelve hours, it was quite evident that the placentitis is present and the membranes would have to necessarily be removed manually.

Vandeplassche and Martens (1961) advocated the manual removal of placenta at an early stage.

Ben-David and Trainer (1962) stated that the best time for removal of placenta was 24 to 48 hours after parturition.

Luktuke and Choudhary (1965) advocated for manual removal of afterbirth of the cow after 24 to 48 hours of parturition.

OTHER FORMS OF TREATMENT.

Shaw (1938) treated a large number of cases of retention of placenta with 1 to 3 injections of 4 to 9 ml of posterior pituitary extract after one and a half hours of parturition and compared the efficacy of treatment with nontreated controls. He observed that the incidence of retention of placenta was 1% in the treated group as compared to 10% in the nontreated controls.

Jones et al. (1956) tried a combination of nitrofurazone and urea (Furea bolus) formulated specially for prophylaxis and therapy of uterine infection in cattle. They reported that Furea bolus effectively prevented endometritis and other ontoward sequelae following retained placenta in bovines. Furea bolus usually caused rapid cessation of malodour discharge and other signs of infections. The medication was found to be nonirritating.

Rude (1959) treated 30 cases of retained placenta in cows (one treatment with 3 - 5 Furea boluses inserted manually into the uterus). 28 out of these 30 cows became pregnant, thus resulting in 93% conception rate.

Benesch and Wright (1960) advocated the use of 10 ml of pituitary extract in cases of retention of placenta.

Holy (1962) treated 60 cows with retained placenta with Furea bolus at the dosage of 2 - 6 boluses per animal and concluded on the basis of his result that Furea bolus can be considered as a suitable product for the treatment of retained placenta not only on account of its efficacy, but also for its economy.

Banerjee (1966) treated retained placenta cases with terramycin tabs intrauterine within 72 hours postpartum and found that the bacterial infection were checked effectively and the cow involuted earlier.

Miyakawa (1966) gave intramuscular injection of a synthetic oxytocin preparation into 22 cows which had not

expelled the placenta 12 hours after parturition. The treatment produced expulsion in 10 cows within 48 hours.

Kari and Pathak (1970) treated seven cows and 9 buffaloes having retained placenta with one or two pessaries of Terramycin AFT (Pfizer), Compron (M & B) or Hibitane (ICI) and observed in one cow second degree of endometritis and in one buffalo 1st degree of endometritis. Rest in all the cases they observed no complication as they recovered successfully.

Sharma (1972) used Leptaden for the treatment of retained placenta in cows and observed efficient results. He also recommended that Mifex given intravenous was a good supportive treatment of retained placenta.

Desmukh (1975) studied the comparative efficacy of Compron (M & B), Steclin (Squibb) and Terramycin tablets (Pfizer) against retained placenta in buffaloes and reported that Steclin intrauterine was superior to other two drugs for the treatment, through results were reasonably good from other two drugs also.

Sinha (1975) found promising results in the treatment of retained placenta with a combination of Uniberbile and Terramycin.

INVOLUTION OF THE UTERUS IN THE RETAINED AFTERBIRTH CASES.

The uterus is increased in size during pregnancy for accomodating the foetus. Involution of the uterus is a

process by which gravid uterus returns to pregravid condition after delivery. Complete involution is indicated by the return of the uterus to the normal position (near the pelvic region), size, tone and consistency.

Servatius (1909) reported detailed clinical studies on involution of uterus in Simmenthal breed of cows and found that volume of the uterus was half by 7th or 8th day after parturition and on 14th day the uterus involuted roughly to its pregravid size and shape. Thereafter, involution proceeded at a much slower speed.

Albrechtsen (1917) stated that complete involution of the uterus in cow occurred within three to four weeks and thereafter, post-partum oestrous occurred.

Casida and Venzke (1936) studied involution of uterus in Holstein Friesian cows and found that uterus returned to normal size, tone and position in about 26.2 days.

Boyd (1950) observed that a mild uterine infection often delayed normal involution by 7 to 10 days and it generally occurred after 30 to 60 days in cases of Brucella abortus infection.

Rasbech (1950) described the process of involution in Danish cattle in three stages. The first was disappearance of stalk of cotyledons through vasoconstriction within 9 days, the second was dissolution and detachment of the superficial layer of cotyledons within 10 to 16 days and the

third was the returning to complete normal state. He recorded that all the three processes were completed within 18 to 21 days in primiparous and 20 to 25 days in pluriparous cows.

Buch et al. (1955) studied on post-partum oestrus and involution of the uterus in Holstein Friesian cows in 252 normal calvings and 72 abnormal calvings and observed that following normal calvings the involution was completed within 45 days in primiparous and within 47 days in pluriparous cows and 52 days in animals having abnormal calvings 48 days in primiparous and 56 days in pluriparous cows. He also observed that seasons significantly affected the uterine involution. The observations were as follows : -

Seasons	Primiparous		Pluriparous	
	No. of cows	Average interval to involution.	No. of cows	Average interval to involution.
Winter	8	49	15	64
Spring	8	44	12	64
Summer	2	47	11	42
Autumn	5	51	10	52

Swamy (1967) studied the normal involution of uterus in cows and reported that following the expulsion of foetus and membranes in the cow, the contractions and

peristalsis of the uterine wall continued strongly due to the reduction of progestrone and increase of oxytocin, oestrogen level. He further reported that following factors affected the uterine involution significantly : -

(a) Species.
(b) Calving no.
(c) Season.
(d) Types of placenta.
(e) Breed.
(f) Abnormal calvings.
(g) Retained placenta.
(h) Metabolic diseases.
(i) Cystic ovaries.
(j) Retained lochea.

Marion et al. (1968) reported the involution of uterus in pluriparous and primiparous cows to occur on an average of 40.6 and 34 days respectively in normal calvings, but indicated delayed involution of uterus in retained placenta cases. They also studied the involution of uterus in primiparous and pluriparous cows during the four seasons and found that the time taken was 40.1 and 36.4 days in fall, 44.1 and 36.5 days in winter, 38.2 and 30.4 days in spring and 37.8 and 31.1 days in summer respectively.

Morrow et al. (1969) explained that the uteri of the abnormal cows were longer during the early post-partum

period, specially in those cows with retained foetal membranes and metritis. As a result the uteri of the abnormal cows required 3 to 5 days longer to attain the same size as the uteri of normal cows. The gross palpable involution of the uterus progressed gradually from day 14 to 25 in normal cows and to day 30 in abnormal cows. The rate of uterine involution decreased with parity in experimental cows. The older cows have longer uteri than the younger cows and so the involution of the uterus is delayed in the older cows.

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MATERIALS AND METHODS

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The experiment was conducted on fifty five non-descript cows that turned up for the treatment of retained afterbirth at the department of Gynaecology and Obstetrics, Bihar Veterinary College, Patna. Both primiparous and pluriparous cows were included in the experiment. Cows that had calved only once were designated as primiparous and those that had calved twice or more were considered pluriparous. Among the pluriparous cows those with the maximum of the 5th calving were only included in the present study. If the afterbirth was retained for more than 12 hours after parturition, then only the case was considered pathological. The study was conducted during the period from February 1976 to December 1976.

The design of the experiment was such that the animals to be treated for retained afterbirth were divided into the following three groups randomly and treatment was carried out as noted against each group : -

Group - I : Manual removal of the placenta followed by a single intrauterine treatment with four Furea boluses. 18 cows were included in this group.

Group - II : Manual removal of the afterbirth followed with 5 ml intramuscular injection of oxytocin. One hour after the injection of oxytocin four Furea boluses were

introduced in the uterus at a time. The group consisted of 18 animals.

Group - III : Manual removal followed by 250 ml of subcutaneous administration of Mifex and four Furea boluses in the uterus at a time. The group consisted of 19 animals.

Medicines used in the experiment.

(1) Furea bolus : - Properties as per product notes compiled by Animal Health Products Department, Smith Kline and French (India) Ltd. Bangalore.

Composition :

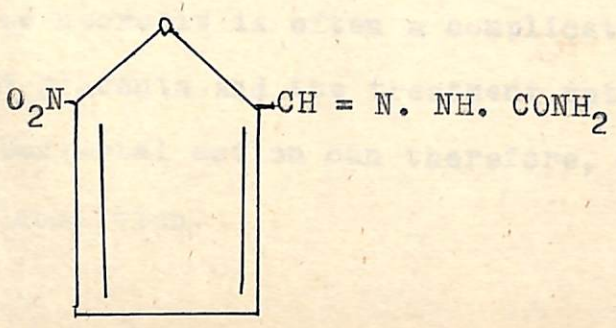
Each Furea bolus contains :

Nitrofurazone, B.Vet.C.	-	0.06 gm
Urea, I.P.	-	6.00 gm

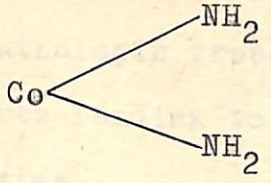
Chemical description of active ingredients

(a) Chemical name - 5 Nitro-2 Furaldehyde Semi-Carbazone.

Structural formula - It is a nitrofuran compound having the following structural formula :



(b) Urea - (Syn - Carbamide)

Molecular formula 

Rationale for the combination of Urea and Nitrofurazone.

(a) Nitrofurazone has a broad antimicrobial spectrum covering a large number of Gram-positive and Gram-negative bacteria involved in causing inflammation, retained placenta, in cattle, buffaloes, sheep, goats and mares.

Organisms that can often be involved in such conditions in these species of animals are staphylococci, streptococci, Corynebacterium, Esch. coli, Pseudomonas, Brucella and Vibrio among others.

Being a nitrofuran compound, nitrofurazone also does not usually permit the development of drug resistance among bacteria and is at the same time safe and economical for routine use.

Due to its mode of action, nitrofurazone is "germ killing" rather than merely germ-inhibiting as is often the case with some antibiotics.

(b) Tissue necrosis is often a complicating factor in cases of retained placenta and the treatment rationale exerting only antibacterial action can therefore, often fail to relieve the condition.

Urea has a proteolytic action and its combination with Nitrofurazone in Furea, therefore, results not only in germ killing and arrest of pathologic process but also in dissolving the necrotic tissues leading to removal of necrotic debris at the same time.

Due to this double attack malodour associated with "retained placenta" is thus eliminated quickly after treatment with a combination of urea and nitrofurazone, while the dissolution of necrotic debris favours automatic removal of placenta.

(c) Urea dissolves quickly in body fluids and is thus able to penetrate the mucous folds of the uterus, thus allowing antibacterial action at focus of inflammation.

Published evidence from clinical studies carried out with the combination product shows that not only such treated cows return to normal quickly, but also that there is improvement in their subsequent conception and calving rates.

Dose - 3-5 boluses intrauterine (As per product notes compiled by : Animal Health Products Department S.K. & F. (India) Ltd.

(2) Mifex (May and Baker Ltd., Bombay-78) 450 ml.

Contains :

Calcium gluconate B.Vet.C.	-	20.80 per cent W/v
Boric acid B.Vet.C.	-	4.20 per cent W/v
Magnesium Hypophosphate	-	5.00 per cent W/v
Dextrose B.Vet.C.	-	20.00 per cent W/v

Presentative :

Chlorocresol B.Vet.C. - 0.1 per cent W/v

Dose - Cattle 200-350 ml intravenous or subcutaneous.

(3) Oxytocin injection B.Vet.C. for intramuscular use only.

5 units per ml (oxytocic activity)

Phenol I.P. - 0.5% W/v (S.R.Pharmaceuticals, Parwati Ind.Estate Lower Parel, Bombay-13).

Manual removal.

The hind quarters of the animals were thoroughly washed with water and wiped. For removing the afterbirth the hands were cleaned thoroughly with soap and water and sterilized gloves were used. The hanging part of placenta was caught by one hand and the other hand was introduced in the uterus. Placentomes were grasped gently one by one and the foetal membranes were separated by a rolling, pushing and squeezing motion by thumb and forefingers. Finally the retained mass was brought out by gentle traction. All aseptic and antiseptic measures were taken in handling the animals. After removal of the placenta treatments were given as discussed before.

Observation on involution of uterus.

Involution of the uterus was taken to be guideline

for judging the efficacy of the treatment. Involution of the uterus was observed by rectal examination in all the cases at intervals of 7 days till the involution was thought to be complete on clinical examination.

A thread was tied to the tips of the forefinger and it was taken to the anterior most approachable portion of the uterus. Then the length from the tip of the finger to the vulva was measured. The same process was adopted during different examinations. The decrease in the length at subsequent weekly examination was considered to be mainly due to regression of uterus and cervix as the length of vagina was thought to be almost constant. The guideline for complete involution was taken on the basis of these suggestions of Buch et al. (1955) who stated as follows :

(a) Return of the uterus to the normal location in the pelvis or pelvic region.

(b) Normal and approximately equal size of the uterine horns.

(c) Attainment of normal uterine tone and consistency.

Serum calcium level.

Calcium level in blood serum was estimated according to Clark collip modification of the Kramer Tisdell Method (1925) as described by Hawk et al. (1965), which was as follows :

Principle :

Calcium is precipitated directly from the serum as oxalate and the latter is titrated with Potassium permagnate.

Procedure :

Two ml clear serum was taken in 15 ml centrifuge tube in which 2 ml of distilled water and 1 ml of 4 per cent Ammonium oxalate were added. The whole content was mixed thoroughly and left for 30 minutes. Again the content was mixed and centrifuged for about 5 minutes at 1500 revolutions per minute. After centrifuge the supernatant fluid was poured off carefully. Then the tube was inverted and kept on a filter paper pad. The precipitate was stirred up and washed with 3 ml of dilute Ammonia (2 ml of concentrated Ammonia to 98 ml of water). Washing was repeated for 2 to 3 times and then it was centrifuged again after adding 3 ml of dilute Ammonia. Supernatant liquid was again poured off and dried as mentioned above. Two ml of approximately normal Sulphuric acid (28 ml of concentrated acid to a liter) was added. Then the tube was placed in a boiling water bath for one minute and titrated with 0.01 normal Potassium permagnate solution filled in 0.2 ml graduated microburette. Titration was thought to be completed when pink colour appeared and persisted for atleast one minute.

Calculation.

One ml of 0.01 N. $KMHO_4$ is equivalent to 0.2 mg of Ca (x - b) x 0.2 x $\frac{100}{2}$ mg Calcium per 100 ml of serum.

Where x equals the number of ml of Permagnate required in the titration and b is the blank i.e., the number of Permagnate required to titrate 2 ml of Sulfuric acid solution to the usual end point.

Statistical analysis was done according to the method suggested by Snedecor and Cochran (1967).

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RESULTS AND DISCUSSION

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During the period of study, the incidence of retained afterbirth was found to be 8.4 per cent out of a total number of 650 cases of reproductive disorders of cows. This result was quite similar to the findings of Gotze(1941) and Kennedy (1947) who reported the incidence to be 8.3 per cent. The present finding was also nearer to the finding of Muller (1974) who reported 7.7 per cent incidence of retained placenta in cows. But it varied widely from the observation of Singh and Rao (1957) who recorded 21.2 per cent incidence of retained afterbirth in cows. The observation of the latter workers was much higher than the present finding. This difference was perhaps because the animals on which they conducted experiment (Red Sindhi breed) were kept under farm conditions, were stallfed and they lacked proper exercise whereas in the present study the non-descript animals were maintained under field conditions by different owners and they got ample opportunities for exercise. Shipilov (1966) also reported more incidence of retained placenta in unexercised cows. Breed variations, feeding differences, management as well as climatic variations might also be the causes of fluctuations in results. Tsolov(1962) also reported variations in the incidence of retained afterbirth in different breeds.

Incidence of retained afterbirth.

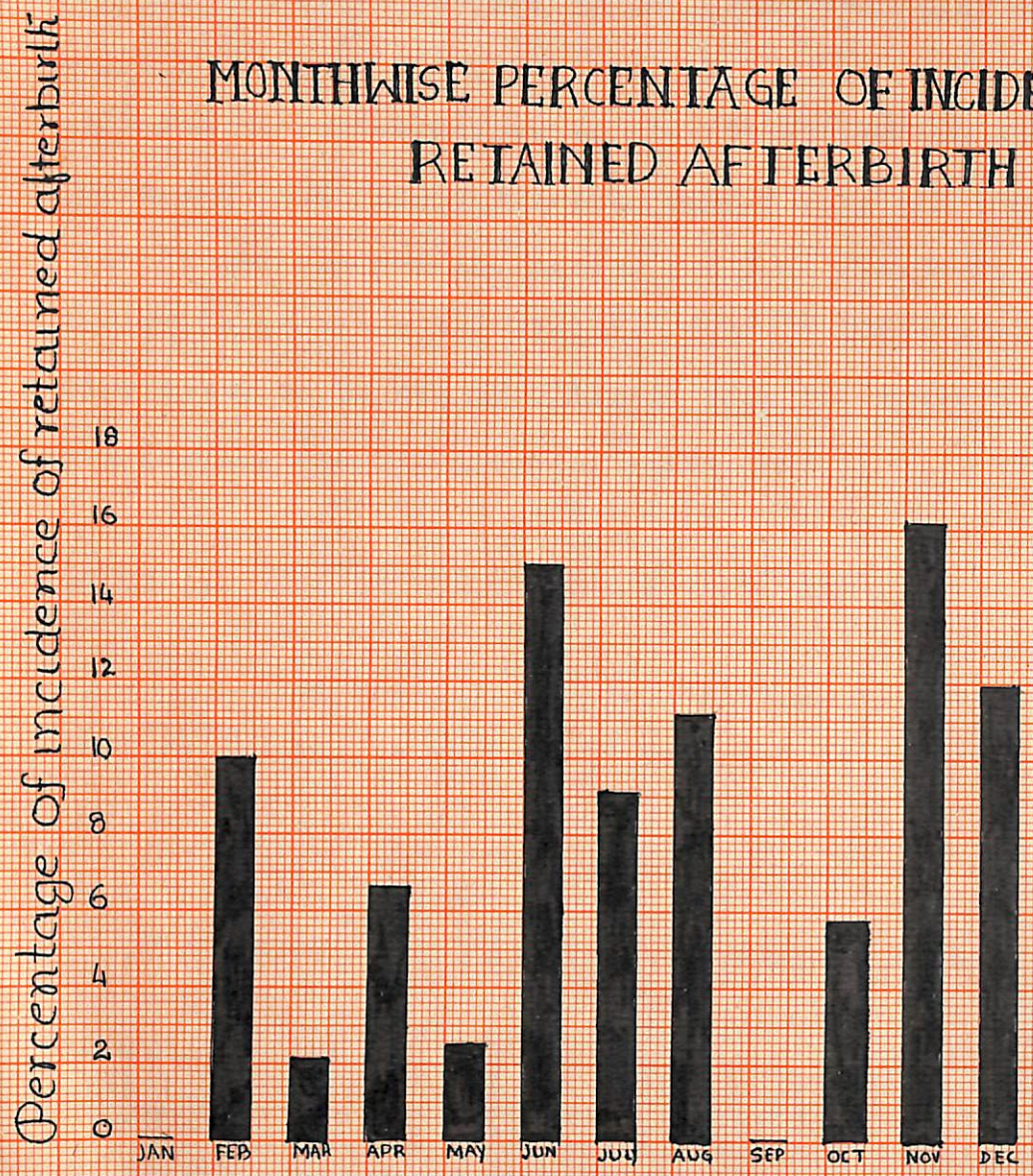
During the period of study monthwise incidence of retained afterbirth out of total number of cases of reproductive disorders in cows was recorded and it was as follows :

TABLE - 1

Table showing the monthwise incidence of retained afterbirth in cows.

Month	Total no. of cases	No.of retained afterbirth.	Monthwise percentage of incidence
January	47	Nil	Nil
February	50	5	10.0
March	48	1	2.1
April	45	3	6.7
May	40	1	2.5
June	60	9	15.0
July	65	6	9.2
August	45	5	11.1
September	40	Nil	Nil
October	52	3	5.8
November	74	12	16.2
December	84	10	11.9
Total	650	55	

MONTHWISE PERCENTAGE OF INCIDENCE OF RETAINED AFTERBIRTH



From table above it was evident that maximum cases of retained afterbirth was found in the month of November (16.2 %) whereas no incidence was reported in the month of January and September. The present finding is at variance with that of Erb et al. (1958) who reported maximum incidence in Holstein Friesian cows during the month of October and minimum during the month of December. Here again the differences in the results of experiments might be attributed to be due to climatic factors, breed differences and feeding and managemental variations.

Seasonal incidence of retention of afterbirth.

The incidence of retention of afterbirth was studied seasonwise which was recorded as follows :

TABLE - 2

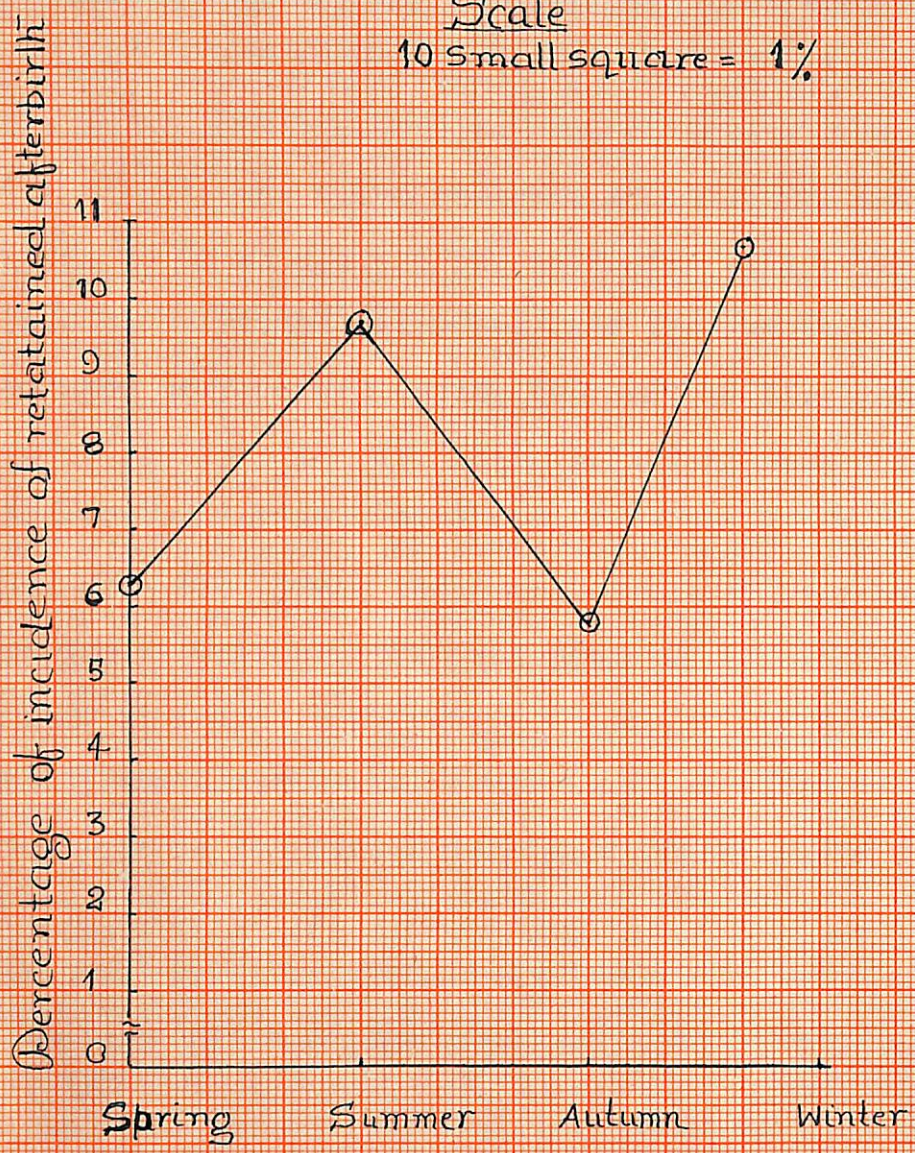
Showing seasonwise incidence of retained afterbirth in cows.

Season	Total no.of cases	No.of retained placenta cases	Percentage incidence of retained placenta(out of total number of cases)	Calculated Chisqure
Spring (Feb.-April)	143	9	6.3	Chisquare = 13.75**
Summer (May - July)	165	16	9.7	3 df
Autumn (Aug.-Oct.)	137	8	5.8	(Tab.chisquare at
Winter (Nov.-January)	205	22	10.7	3 df 1% = 11.34).

** indicate significance at 1% level.

Seasonal Incidence Of retained afterbirth

Scale
10 small square = 1%



From Table 2 it was evident that the maximum incidence of retention of afterbirth was recorded during winter and it accounted for 10.7 per cent of the total number of cases observed. The minimum incidence was observed during autumn season which accounted for 5.8 per cent of the total number of cases. The chisquare test revealed highly significant value (calculated chisquare value for 3 df being 13.75 as against the tabulated values for same df 11.34). Cohen (1956) reported that the retained placenta cases were more common during February to April in the Northern hemisphere. The present finding seemed to be completely at variance with the observations of Cohen (loc. cit.). But the lowest incidence in the present study was supported by Muller (1974) who reported lowest incidence of retained placenta in August to November. Variation in climatic and managemental conditions and differences in breed might be the causes for the differences in the findings of Cohen (loc. cit.).

Effect of sequence of calving on the incidence of retained afterbirth.

Incidence of retained afterbirth was studied according to the sequence of calving in all the 55 cases of retained placenta. The observations were as follows :

TABLE - 3

Showing the incidence of retained placenta according to sequence of calving.

Sequence of calving	Number of retained afterbirth cases	Percentage of incidence of retained afterbirth (out of total number of retained placenta cases)	Calculated chisquare
1	20	36.4	
2	3	5.4	Chisquare =10.27*
4	20	36.4	3 df
5	12	21.8	(Tab.chisquare at 3 df 5% = 7.82)
Total	55	100.0	

* Indicates significance at 5% level.

Table 3 revealed that maximum incidence of retention of placenta occurred after the 1st and 4th calvings (36.4%) whereas lowest incidence was observed after the 2nd calving (5.4%). The incidence after 5th calving was 21.8%. No cases of retained afterbirth were observed after the 3rd calving. The chisquare test revealed significant effect of the sequence of calving on the incidence of this condition in cows. The present finding of highest incidence of retained afterbirth at first calving was tallied with the findings of Singh and Rao (1957) who observed 45% incidence of retained placenta among the first calvers. The present finding also

Frequency of occurrence of retained afterbirth in different lactations

SCALE
10 small square = 4%

(Based on total number of retained afterbirth cases)

agreed to the findings of Panichi (1964) who recorded the maximum incidence of retained placenta after the 1st and 4th calvings and the minimum after the 2nd and 3rd calvings. But the findings differed with Erb et al. (1958) who reported 5.4% incidence of retained afterbirth in first calving which was too low compared to the present finding. Variation in findings might be due to breed, feeding, managemental and climatic differences.

Calcium level in blood in cases of retained afterbirth.

Calcium content of blood was estimated in all the experimental cows just after removal of placenta. The overall mean level of calcium was observed to be 10.0 ± 0.77 mg per 100 ml of blood serum. Kennedy (1947) reported low calcium level of blood in cases of retained afterbirth in cows which was 7 to 13.1 mg per 100 ml of blood serum and Flegmatov and Shipilov (1961) reported calcium level blood in retained placenta to be 8 to 10 mg per 100 ml of blood. The present finding appears to be closer to the findings of above workers.

Blood calcium level in different treatment groups.

In the first treatment group in which manual removal of placenta was followed by the administration of 4 Furea boluses intrauterine at a time consisted of 18 animals. The mean blood calcium level in this group was found to be 9.8 ± 2.31 mg per 100 ml of blood serum.

The second treatment group in which manual removal of placenta was followed with intramuscular injection of 5 ml of oxytocin and one hour after that intrauterine administration of 4 Furea boluses at a time also consisted of 18 animals. The mean blood calcium level in this group was found to be 10.4 ± 0.37 mg per 100 ml of blood serum.

In the third treatment group in which manual removal of placenta was followed by the administration of 250 ml of Mifex subcutaneously and then 4 Furea boluses intrauterine also consisted of 19 animals. The mean blood calcium level in this group was found to be 10 ± 0.37 mg per 100 ml of blood calcium level in this group was found to be 10 ± 0.37 mg per 100 ml of blood serum.

TABLE - 4.

Showing the homogenisity in the level of blood calcium in three treatment groups.

Sources of variation	df	M. S.
Between treatment groups	2	2.83 NS
Within treatment groups	52	5.32
Total.	54	

NS indicates non-significant.

From the above table it revealed that all the three groups of animals with retained placenta did not differ among themselves as regards the calcium content of blood.

Effect of season on involution of uterus after removal of placenta.

Seasonwise uterine involution was studied in all cases of retention of placenta and the observations are recorded in the following Table 5.

TABLE - 5

Seasonwise mean involution time along with S.E.

Season	Number of cases	Mean involution time ± S.E. (days)
Spring (Feb. - April)	9	44.3 ± 1.00
Summer (May - July)	16	38.9 ± 1.10
Autumn (Aug. - Oct.)	8	50.8 ± 1.75
Winter (Nov.-January)	22	56.0 ± 1.05

TABLE - 6

Analysis of variance showing the effect of season on the mean involution time (days)

Sources of variation	df	M. S.
Between seasons	3	965.43**
Within seasons	51	160.87
Total	54	

** denote significance at 1% level.

In the present study the maximum interval to involution (involution time) of uterus was noted in winter (56.0 ± 1.05 days) whereas the minimum was recorded in the summer season (38.9 ± 1.05 days). The mean involution time during the autumn season was 50.8 ± 1.75 days and during spring season it was 44.3 ± 1.00 days. The analysis of variance run showed that seasons highly significantly affected uterine involution time. The results of the present study agreed to the findings of Buch et al. (1955) who reported significantly lower interval in the regression of uterus during the summer than that in winter. Marion et al. (1968) who reported the maximum involution period (44.1 days) to be in winter and minimum in summer (37.8 days) also agreed with the findings of the present study. But the present findings were at variance with that of Morrow et al. (1969) who reported no significant effect of season on uterine involution time. The differences in the present results and that of Morrow (loc. cit.) might be due to climatic factors, or due to breed difference and difference in managemental and feeding practices.

Effect of parity on involution of uterus after the removal of placenta.

The involution time of uterus was studied separately in primiparous and pluriparous cows. The mean involution time in 22 primiparous and 23 pluriparous cows was observed to be 47.1 ± 1.04 days and 50.7 ± 0.84 days respectively. The results of the present finding agreed to

the findings of Buch et al. (1955) who reported the involution time of uterus after removal of placenta on an average in 48 and 56 days in primiparous and pluriparous cows respectively. Marion et al. (1968) observed involution time in pluriparous animals to be longer in comparison to primiparous animals. This observation appeared to be similar to the findings of the present study where also involution time in the case of primiparous was recorded to be shorter than pluriparous animals. The findings of Rasbech (1950) differed with the present finding as the mean involution time of uterus recorded by him was 18 to 21 days and 20 to 25 days in primiparous and pluriparous cows respectively. The variations in the results might be due to methodological differences or due to differences in breed, climate or managemental conditions.

Analysis of variance was run to see the effect of parity on the time taken for involution of uterus. It revealed no significant difference in involution time between primiparous and pluriparous cows, which was evident from following Table - 7.

TABLE - 7.

Showing effect of parity on the time taken for involution of uterus.

Sources of variation	df	M. S.
Between primiparous and pluriparous animals	1	288.47 NS
Within primiparous and pluriparous animals	53	187.23
Total	54	

NS denotes non-significance.

Effect of treatment on involution of uterus after removal of placenta.

After the treatment of retention of afterbirth the process of involution of uterus in every case was studied. The guideline for observing the process of involution of uterus was fixed as per the method adopted by Buch et al. (1955) which was as follows : -

(a) Return of the uterus to the normal location in the pelvis or pelvic region.

(b) Normal and approximately equal size of the uterine horns.

(c) Attainment of normal uterine tone and consistency.

Length from the lips of vulva to the anterior most approachable part of the uterus was measured at weekly intervals in all the cases of retained afterbirth by rectal palpation. The observations in respect of each treatment group were recorded in the following Table 8.

TABLE - 8

Treatmentwise mean length along with S.E. (inches) from the lips of vulva to the anterior most approachable part of the uterus.

Week	T_1 Mean ± S.E.	T_2 Mean ± S.E.	T_3 Mean ± S.E.
1	24.9 ± 0.21	24.8 ± 0.35	25.1 ± 0.67
2	22.7 ± 0.61	21.5 ± 0.42	21.4 ± 0.52
3	20.6 ± 0.27	19.4 ± 0.13	18.3 ± 0.40
4	19.1 ± 0.11	17.9 ± 0.64	16.8 ± 0.61
5	17.9 ± 0.14	16.8 ± 0.37	15.7 ± 0.53
6	16.8 ± 0.10	16.2 ± 0.30	15.3 ± 0.45
7	16.2 ± 0.20	15.7 ± 0.11	15.3 ± 0.45
8	15.7 ± 0.18	15.4 ± 0.14	
9	15.5 ± 0.15	15.4 ± 0.14	
10	15.5 ± 0.15		

N.B. - T_1 - First treatment group

T_2 - Second treatment group

T_3 - Third treatment group

From the table above it was evident that in the first treatment group, the constant mean length (from the vulva to the anterior most approachable part of the uterus)

which was 15.5 ± 0.51 inches was observed, 9 weeks after the removal of placenta. Thereafter, no reduction in length was observed. So it was concluded that the cows in this treatment group involuted their uterus maximum by 9th week. But in the second treatment group the constant mean length (15.4 ± 0.14 inches) was obtained at 8th week and so it was thought that the cows in this treatment group involuted their uterus maximum by 8th week. In the third treatment group the involution was observed to be rather rapid as the constant mean length (15.3 ± 0.45 inches) was observed only at 6th week.

Therefore, on the basis of above observation the treatmentwise mean involution was observed to be 57.5 ± 0.91, 51.3 ± 1.01 and 39.4 ± 0.95 days in first, second and third treatment groups respectively. The third treatment was observed to be most effective as the time taken for involution of uterus in this treatment group was minimum (39.4 ± 0.95 days). It is presumed that Mifex which was used in this treatment group might have helped in tonning up the uterus and causing early involution. In the order of effectiveness the second treatment schedule was found to be next to the third treatment as the time required for involution was noted to be 51.3 ± 1.01 days. Efficacy of this treatment is presumed due to inclusion of oxytocin in this treatment group. The least effective treatment was found to be the first treatment in which maximum time was taken for the involution of uterus (57.5 ± 0.01 days).

Analysis of variance was run to see the effect of treatments on the involution time which is given in the following Table 9.

TABLE - 9

Showing the effect of treatments on the time taken for the involution of uterus.

Sources of variation	df	M. S.
Between treatment	2	1248.32**
Within treatment	52	

** denote significance at 1% level.

From the table above it was evident that the effects of different treatments on the time taken for the involution of uterus were highly significant between first and third and second and third treatment groups but not between first and second treatment groups.

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S U M M A R Y

SUMMARY

The incidence of retained afterbirth was recorded to be 8.4 per cent out of 650 cases of reproductive disorders in cows examined at the department of Gynaecology and Obstetrics, Bihar Veterinary College, Patna.

The maximum of incidence of retained afterbirth was recorded during the month of November (16.2%) and no incidence was observed during January and September.

The influence of season on the incidence of retained afterbirth was highly significant. The maximum incidence i.e. 10.7 per cent was recorded during winter.

Sequence of calving also had significant effect on the occurrence of retained afterbirth. The maximum incidence 36.4% out of total number of 55 cases was recorded in first and fourth calvers and minimum 5.4% in second calvers. No incidence was recorded in third calvers.

The mean calcium content of blood in first, second and third treatment groups was found to be 9.8 $\pm$ 2.31, 10.4 $\pm$ 0.37 and 10.0 $\pm$ 0.37 mg per cent respectively which did not vary significantly among themselves. The overall mean calcium level in blood in the cases of retained afterbirth was found to be 10.0 $\pm$ 0.77 mg per cent.

Influence of parity on the time taken for the involution of uterus was studied. On clinical examination it was observed that involution of uterus was completed on an average in 47.1 ± 1.04 days in primiparous and in 50.7 ± 0.84 days in pluriparous cows.

Seasonal influence on the involution time was also observed and it was noted aht during summer the time taken for involution of uterus was the minimum (38.9 ± 1.10 days) whereas during winter the time taken was the maximum 56.0 ± 1.05 days.

The involution time in different treatment groups was also studied and it was seen that in the third treatment group the time taken for involution of uterus was the minimum that is 39.4 ± 0.95 days and in the first treatment group the time taken was the maximum that is 57.5 ± 0.91 days.

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