RETAINED PLACENTA IN THE BOVINE. A BRIEF REVIEW*

G. D. Wetherill†

Introduction

Retained placenta in the bovine is most accurately described as failure of the fetal placenta (tufts) to separate from the maternal placenta (crypts).

Following implantation the modified endometrium of the uterus allows attachment of the fetal placenta and the fetal villi interdigitate with the maternal crypts. Electron microscope study has illustrated that micro-villi are also found between the cryptal and chorionic epithelial cells where interdigitation occurs (2).

In a normal physiological birth three stages are recognized: (1) dilation, (2) delivery of the fetus, and (3) expulsion of membranes.

Stage three is the beginning of the process of involution, which usually takes about three weeks. At the time of rupture of the umbilicus the blood supply to the uterus is diminished and vasoconstriction of the caruncular stalk occurs (7). The maternal cotyledons become smaller and the crypts dilate; no further blood is supplied to the fetal villi and they in turn shrink. In a normal birth disintegration of the epithelial cells of the placenta begins at the time of birth of the fetus. This disintegration is thought to be triggered by the action of an enzyme but the mechanism is as yet poorly understood. When the membranes are expelled normally there is no maternal epithelium attached to the fetal villi (8). Functional closure of the cervix is present at 24 to 36 hours, but it is then still readily dilatable.

The role of uterine motility is not clear. The uterus normally contracts approximately fourteen times an hour immediately following parturition but the frequency gradually diminishes to once every hour at 42 hours. The contractions are very strong during the first hours and have a duration of one minute to two and one-half minutes. Suckling appears to have little effect on the rate or the amplitude of the contractions. With delayed involution of the uterus, which is associated with retention of the membranes, the rate of contractions is often increased but the contractions tend to be tetanic (10).

The fetal membranes are usually expelled within two to eight hours of parturition. Any retention beyond 12 hours may be considered pathological.

Etiology

Practitioners are frequently asked why a certain cow does not "clean", and the most widespread panacea would seem to be the feeding of certain proprietary brands of mineral. Certain etiological factors are self-evident and anything which predisposes to uterine inertia also predisposes to retained placenta. The obvious conditions are dystocia (particularly when due to an oversize fetus), uterine torsion, abortion, stillbirth, hydrops, milk fever, and multiple birth. The age of the animal and its physical condition are also factors. Animals that have retained their membranes once apparently have a strong tendency to repeat this performance in subsequent years.

The effect of diet on the condition is another unknown quantity. There is a high incidence of retained membranes in areas where carotene levels are low. Mineral deficiencies, especially of iodine, are often believed to be contributing factors but this relationship has not been proven (9).

Conditions predisposing to placentitis must be considered. Low grade infections (i.e., vibrio and molds) may establish themselves in the gravid uterus causing a mild endometritis and placentitis although they are not sufficiently pathogenic to

*From a paper presented to the Ontario Veterinary Association Convention, Toronto, Ontario, January 27–29, 1965.

†Listowel, Ontario.

cause fetal death (9). There is a high incidence of retained placentae among known cases of brucellosis.

There apparently is a relationship between the length of gestation and the retention of the membranes. The incidence seems to be highest when the gestation period is less than 273 days or greater than 285 days. Cohen (4) considers that the length of the gestation period is influenced by the bull used. He has established that in the case of births initiated by certain bulls, in which the gestation period was close to the average for that bull, the frequency of retained placentae is less than in the case of calvings in which the gestation periods are noticeably longer or shorter than the average of that bull. This may possibly explain why certain farms may have a high incidence for one or more years, and then revert to practically nil.

It appears that expulsion of the membranes is hormonally controlled and the eventual outcome is due to a favourable or unfavourable balance. As yet it does not appear that an obscure virus can be incriminated.

Incidence

The most extensive survey of the incidence of retained placentae was conducted by Erb *et al.* (5) at the Carnation Farms in the U.S.A.

In the period 1920–1950 there were 10.3% cases of retained placentae out of a total of 7,387 calvings. Of those, 6,162 single calvings had 6.7% of retained placentae; 311 twin calvings had 43.8%; 636 abortions had 25.9% and 270 stillbirths had 16.4%. A total of 19.2% of cows that had previously retained the membranes retained them again in subsequent calvings.

In the author's practice, calls to retained placentae varied between 5.5% and 6.8% of total farm calls over a five-year period. For nine months of the year the incidence is closely related to the number of cows calving although a marked rise in March, April, and May, and an equally marked decline at "grass time" seem to show the effects of prolonged winter housing.

The author's records demonstrate that certain farms had many cases of retained placenta while others had few or none. First calf heifers and older cows seem to have a higher incidence than animals delivering their second, third, or fourth calf (Table I).

Pathology

The uterus is usually swollen and is slow to return to its non-gravid state. Until it shrinks, the villi remain firmly attached. There is inevitably a placentitis of varying degree (6). Different kinds of membranes are found. They can be classified as distinct types for ease of description.

TABLE I

Survey of Retained Placentae 1959–63[1]

	1959	1960	1961	1962	1963
Jan.	21	26	28	23	26
Feb.	26	17	29	25	20
Mar.	47	49	51	94	78
Apr.	67	63	43	60	57
May	38	39	45	42	44
June	21	28	23	29	50
July	21	31	31	36	26
Aug.	16	22	19	31	15
Sept.	23	24	31	36	17
Oct.	17	11	14	30	26
Nov.	19	20	32	23	38
Dec.	23	19	24	24	23
	339	349	368	453	420
Farm Calls	6050	5800	6400	6650	7050
% of farm calls	5.5	6.0	5.6	6.8	6.0

[1]From records of Listowel Veterinary Clinic, Listowel, Ontario.

(1) Thin, tissue-like membranes which usually defy removal and show as a fine string hanging from the vulva. The cotyledons are usually turgid and often quite large.

(2) Thick, granular-type membranes which can usually be removed intact.

(3) A semi-liquid, jelly-like mass, often with very little tissue attached to the cotyledons.

(4) An extremely tough type of membrane which frequently demonstrates little sign of putrefaction, even less inclination to become detached.

These types could also be classified according to odour but this method does not readily lend itself to description.

With mold infections the cotyledons are enlarged, thickened, and often yellowish in colour.

Fatty degeneration and desquamation of the superficial layer of the caruncle occur when the placenta is not expelled. This is usually completed in 10 days and resolution takes place in 40–50 days (7). The presence of membranes in the birth canal retards closure of the cervix.

The common contaminants are coliforms, clostridia, corynebacteria, staphylococci and streptococci.

Treatment

There are three broad methods of dealing with a case of retained placenta:

(1) Manual removal, with or without medication (parenterally, locally, or both).

(2) Medication and leaving the membranes.

(3) No treatment.

Manual removal is contraindicated in many cases. It should not be attempted unless the placenta can be detached without causing irritation and hemorrhage or if there is a danger of leaving remnants attached to the cotyledons. Decomposing placental tissue increases the nutrient supply to the anerobic bacteria present (7).

Removal is detrimental when the case is complicated by vaginal necrosis, or laceration. This causes great discomfort to the patient. Manipulation of the uterus is undesirable when there is a febrile reaction or when the animal appears toxemic.

If straining is intense epidural anaesthesia is of value. The patient probably appreciates the small measure of relief that this affords.

It is difficult to be dogmatic about the length of time that retained membranes should be left before removal is attempted or treatment is instituted. There is a divergence of views on the optimum time, ranging from a few hours after parturition up to a few days or more. In the author's practice these cases are usually left for 48 hours. The membranes are removed when they will come away with ease and the uterus is then medicated with either a sulfa-urea type of preparation or with a broad spectrum antibiotic. Excellent results have been obtained by introducing one gram of tetracycline into the uterus in a small paper envelope. Penicillin given intramuscularly is occasionally of value. When there is an excessive volume of fluid this is syphoned off with a stomach tube.

It should be decided early in the exploration of the uterus if the membranes are to be left. These cases form a large proportion of the number observed by the author. In such cases, estrogen-nitrofuran suppositories[1] are routinely used as medication and in most cases the membranes are passed in the next four or five days. The author prefers to revisit these cases ten days later and either insert more suppositories or infuse the uterus. Since adopting this method of treatment bad cases of endometritis that often followed removal are rarely seen.

Cattle showing febrile reactions and necrotic vaginitis are treated in a similar manner together with a dose of penicillin.

Farmers usually feel that membranes should be removed on the first call and they may resent revisits. Their feelings can be appreciated as a cow with membranes hanging from her is undesirable in the stable. The practitioner, however, should have the courage of his convictions because an attempted removal, when difficult, damages the uterus. This increases the risk of septicemia and retards recovery.

Since evidence has demonstrated that

[1]Utonex. Ethinyl estradial 3 mg., nitrofurathiazide 30 mg. Schering Corporation, Pointe Claire, Quebec.

retention is the net result of a hormone imbalance it would appear rational to resort to hormone therapy. Some practitioners state that they obtain good results by the administration of posterior-pituitary extract or oxytocin. These drugs, however, must be administered within a few hours of parturition in order to exert any effect on the uterus. At the time that this therapy is required the author believes that his clients would still be optimistic enough to expect that the cow would clean.

Stilbestrol given parenterally seems undesirable as it increases the blood-supply to the uterus. The author has not had any noticeable results using estradiol.[2] Many reports have been published regarding the efficiency of these drugs and many reports disclaim them.

The role of progesterone is not yet clear. It is thought to be involved in the triggering of the necrosis of the epithelial cells by enzyme action. It is believed that there is a low progesterone level in animals that retain the fetal membranes. MacDonald (8), using animals with the corpus luteum ablated before parturition, demonstrated that when progesterone was not given or when it was administered at a low level the animals showed a tendency to retain the membranes. The group receiving a high level, however, had a significantly lower incidence.

The proteolytic enzymes have not lived up to expectation but they appear to be of value in the treatment of chronic metritis. Parenteral diuretics of the hydrochlorothiazide type have claimed to be effective but again there is conflicting evidence. No marked benefit was evident when used by the author.

The use of antibiotics has improved the prognosis of a case of retained placenta dramatically. The mortality rate at the Berne, Switzerland, Ambulatory Clinic dropped from 11.1% to 1.5% in 1951 (3).

Discussion

Although following many cases of retained placenta the uterus returns to normal after two to three months and several heat periods there is an economic loss due to diminished milk production in obviously sick animals.

Serious complications are frequently associated with retained placenta in cows. An impairment of fertility may follow a prolonged discharge and a chronic endo- or myo-metritis. If pus is present in the uterus this may be manifested by irregular estrus cycle or anestrus. An ascending infection of the fallopian tubes may result in the loss of patency. An infected uterus appears to be the commonest site of action for *Cl. tetani* in the bovine.

The infection may also result in cystitis or peritonitis by extension from the uterus.

Conclusions

The author believes that considerable time can be saved by examining cows 30 days post-partum and treating the ones that don't show normal involution of the uterus.

Some figures published by Banerjee *et al.* (1) are outlined in Table II. These workers studied the resulting conception

[2]E.C.P. Estradiol nitrofarathiazide. Upjohn Company of Canada, Don Mills, Ontario.

TABLE II

Results of Various Treatment Regimes for Retained Placentae (from Banerjee, 1)

Group[1]	Treatment	Conception Rate at 1st Service %
1	Oxytetracyline[2] intra-uterine at 72 hours, placenta not removed	70.0
2	Oxytetracycline intra-uterine, placenta removed	38.9
3	No medication, placenta left	50.0
4	No medication, placenta removed	38.5

[1]123 cows divided into the four groups.
[2]Terramycin. Pfizer Canada, Montreal, Quebec.

rates of groups of cows that had retained their fetal membranes and had been treated in different ways. The results illustrated that manual removal brought about greater infection which was not adequately controlled by oxytetracycline.

Summary

A brief review of the etiology, incidence, pathology and treatment of retained placenta in the bovine are presented.

One of the main causes of retained placenta is believed to be an unfavourable hormone balance together with physical factors which cause uterine inertia.

It is emphasized that manual removal of placenta may frequently be contraindicated and that the use of antibiotics *in utero*, or in association with systemic treatment, has dramatically improved the prognosis in cases of retained placenta.

Résumé

On présente ici une brève revue de l'étiologie de l'incidence, de la pathologie et du traitement de la rétention du placenta chez la race bovine.

On croit qu'une des principales causes de la rétention du placenta consiste dans un équilibre hormonal défavorable accompagné de facteurs physiques qui causent une inertie utérine.

On insiste sur le fait que l'enlèvement manuel du placenta n'est pas à recommander dans tous les cas et que l'emploi d'antibiotiques dans l'utérus, ou en relation avec un traitement de l'organisme, a amélioré de façon dramatique la prognose dans les cas de rétention placentaire.

References

1. Banerjee, A. K. A study of the action of Terramycin on the bacterial flora of the uterus in cattle following retained placenta. Thesis, Utrecht. 1963.
2. Bjorkman, N., and Bloom, G. On the fine structure of the foetal-maternal junction in the bovine placentome. Z. Zellforsch. 45: 649. 1957.
3. Buser, E. Methods of treatment of retention of the placenta and puerperal infections in cattle from 1921–1951. Schweiz. Arch. Tierheilk. 95: 542. 1953.
4. Cohen, Ph. Statistical survey of retained placenta and other factors associated with bovine reproduction. Doctorate thesis, Univ. Utrecht. 1956.
5. Erb, R. E., Hinze, P. M., Gildow, E. M., and Morrison, R. A. Retained fetal membranes—the effect on prolificacy of dairy cattle. J. Amer. Vet. Med. Ass. 133: 489. 1958.
6. Hulland, T. J. Personal communication. 1964.
7. Jubb, K. V. F., and Kennedy, P. C. Pathology of domestic animals. Vol. I. New York and London: Academic Press. 1963.
8. McDonald, L. E., McNutt, S. H., and Nichols, R. E. Retained placenta—experimental production and prevention. Amer. J. Vet. Res. 15: 22. 1954.
9. Roberts, S. J. Veterinary Obstetrics and Genital Diseases. Ithaca, New York: Published by the author. 1956.
10. Venable, J. H., and McDonald, L. E. Postparturient bovine uterine motility—normal and after experimentally produced retention of the fetal membranes. Amer. J. Vet. Res. 19: 308. 1958.

ABSTRACT

Wright, A. W., and Roncalli, R. (1964). Vitamin A and cattle ketosis—a preliminary reappraisal. Vet. Med. and Small Anim. Clin. 59, 1248–1252.

The history of vitamin A therapy in bovine ketosis is reviewed, and recent work suggesting an effect of vitamin A on adrenal glucocorticoid production is discussed. Each of 130 cows with classical clinical symptoms were given 500 ml. of 50% dextrose soln. i/v and 1,000,000 or 2,000,000 i.u. (according to size) of vitamin A soln. i/m. A single treatment produced prompt recovery in 104 cows, and appetite and milk yield returned rapidly to normal. In 20 cows, two treatments were necessary to produce recovery in three to four days. Six cows received one or two further treatments and recovered within 14 days after the initial treatment. These findings suggest that vitamin A is a useful adjunct to dextrose therapy.

Reprinted from "The Veterinary Bulletin", Vol. 35, No. 5, May, 1965.