SCHEDULING EXAMINATIONS FOR EFFECTIVE REPRODUCTIVE HEALTH CONTROL IN A DAIRY HERD

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SUMMARY

Efficiency of reproduction in a dairy herd is mainly associated with environmental and managemental factors. It is also a product of successful control of herd health reproductive problems. Successful control of herd health reproductive problems usually involves conducting post-calving, regular health clinics at specific time intervals. Reproductive health clinics are conducted during the puerperium and the service period; the two sum up to make the calving to conception oestrus period. The puerperium is the period from calving to the time of completion of uterine involution and resumption of normal oestrous cyclicity. The service period is the period from the time of resumption of normal oestrous cyclicity to conception oestrus. There are several sequential phases that characterize a normal calving to conception period. Each phase is defined by a specific physiological event(s). These physiological events divide the postpartum period into phases, namely recovery from the extended-effects-of-pregnancy, escape from the effects of suckling-milking inhibition of gonadotrophins, recovery from multifactorial effects associated with the initiation of oestrous cyclicity, ovulation and luteal development. In a dairy herd, it is possible to follow the course of these physiological events by making regular scheduled examinations. Scheduled examinations ensure early and accurate detection of reproductive problems whenever physiological events turn pathological. Moreover, early diagnosis ensures early treatment, increases chances of recovery and therefore reduces time from calving to conception oestrus. This paper recommends that a minimum of five scheduled examinations should be done at specified times during the puerperium and service period in dairy cows. The paper in addition, suggest diagnostic methods and therapeutic alternatives that utilize materials readily available in a Tanzanian environment.

INTRODUCTION

Success of the veterinary profession in developed countries has passed through three main developmental stages. Each developmental stage came about as a result of socio-economic development and political change in the society. The first stage emphasized on control of epidemic diseases, diseases that killed animals over large geographical areas. Experience obtained and success gained in the first stage led into selection of areas of emphasis for the second stage. In the second stage, emphasis was placed on treatment of endemic diseases, disease that affected individual farms and cows. The major drawback of the second stage was that it depended purely on initial recognition of diseases by the farmer, whereby the farmer's ability to recognize disease was based on subjective assessment. Advances in the veterinary profession during the second stage saw a shift of emphasis from that of individual cow medicine to that of herd health approach. In the third developmental stage, emphasis continued to be on herd health control programs and particularly on subclinical diseases in intensive management systems.

Although basically these developmental stages were experienced in developed countries, they nevertheless have a great impact on the veterinary medical profession in Tanzania and other developing countries. In Tanzania, for example, major emphasis of the veterinary profession is currently on the control of epidemic and endemic (parasitic and infectious) diseases. At the same time, because of fast changing socio-economic environment, the profession's emphasis is also on herd health control programs though in isolated farms. Present evidence indicates that veterinarians will need to continue expanding their role in herd health services and become even more involved in all management practices, including those indirectly related to animal care.

Thus in Tanzania, activities of a today's veterinarian are comparable to those that characterized the first and second stages of growth of the veterinary profession in developed countries. However, strategy and emphasis on control and treatment of diseases in Tanzania (Africa in general), as it was in developed countries, has to consider and adhere to the level of livestock production as well as that of the society. To be able to realize profit, both epidemic and endemic diseases must be prevented or controlled, and animals with clinical diseases must be treated whenever possible. In addition, because of the present dynamic changes of the society, there is need to plan and institute concurrent herd health programs.

Diseases in a herd, both clinical and subclinical, have an impact on reproduction by lowering fertility. Since profitability in a dairy herd mainly depends on reproductive performance, well planned reproductive control programs should form the main part of a herd health program.

In order for herd health reproductive clinics to be manageable and practical scheduled examinations on postpartum cows should adhere to different physiological phases occurring in the animal. On the basis of these physiological events, the postpartum period is normally divided into five phases for scheduled examinations, namely the periods between Weeks 1-2, 2-4, 5-6, 7-8 and 8-conception. The aim of this paper is to detail the events of each phase of postpartum and suggest ways of treatment using resources available in Tanzania. Also the paper highlights some areas unique to Tanzanian environment which need special attention.

PHASES FOR SCHEDULED EXAMINATIONS POSTPARTUM

(a) Phase between Week 1-2 after calving

In a normal cow, when rectal palpation is performed during the first 14 days after calving, the cervix, uterus, and both ovaries are located in the abdominal cavity. The involuting uterus is firm on palpation and occasionally longitudinal grooves may be detected. The detection of uterine fluid, commonly present as lochia is normal at this stage. There are three disease conditions that usually occur at this stage, especially as consequence of abnormal calving. These are the retention of the foetal membranes (RFM), prolapse of the uterus and puerperal infection.

Retained foetal membranes

It is generally accepted that lack of dehiscence and expulsion of foetal membranes by 12-24 hours after calving constitutes retention (Paisley, 1986). The foetal membranes are retained because the cotyledonary villi fail to detach from the caruncular crypts. The incidence of RFM in a

normal population of calving dairy cows is about 5–10%, with the incidence rising to 25–70% in cases of abnormal calvings (Geyer 1964; Moller et al. 1967; Roberts 1971). The risk of RFM increases with dystocia, shortened pregnancy, twinning, prolonged deliveries and with deficiency of certain vitamins or minerals. It is therefore to be expected that an increase in incidence of dystocia from cross-breeding programs using *Bos taurus* and *Bos indicus* now common in Tanzania, may also increase incidence of retained foetal membranes.

Retained foetal membranes *per se* have minor adverse effects on future fertility of the cow but usually complications such as metritis which occur in more than half of the cases of RFM may result into infertility. If expulsion of foetal membranes does not occur, progressive liquefactive putrefaction followed by massive invasion of microorganisms occur which results into the above mentioned complications. Treatment of RFM has always been a controversial issue (Palmer 1932; Roberts, 1971). Studies by Banerjee (1973) and Gunnik (1973) have shown that manual removal of RFM with or without supportive chemotherapy is usually followed by impairment rather than improvement of fertility. Vandeplassche (1982) associated manual removal of RFM with haemorrhages, hematomas and vascular thrombi in the uteri, even when manual removal was accomplished with no external evidence of trauma. In addition, phagocytosis by uterine leucocytes, which forms an important component of the uterine defence mechanism, is completely inhibited for several days following manual removal. Banerjee (1973) found that conception to first service among *Bos taurus* cows in which RFM were removed manually was 39%, compared to conception rate of 50% in cows to which no treatment was given to retained foetal membranes. Manual removal with an intrauterine infusion of oxytetracycline (OTC) resulted in a conception rate of 39% to first service. In contrast, intrauterine treatment with OTC alone without removal of the RFM resulted in a high conception rate of 70 per cent. More recent work by Bolinder et al. (1988) has shown that manual removal of RFM results in delayed resumption of oestrous activity. In all cases of RFM where the cow shows symptoms of systemic involvement, most authors recommend that manual removal should never be attempted and instead parenteral and local intrauterine treatments with antibiotic agents be administered for a period of five to ten days. To prevent development of puerperal metritis that usually follow as a sequelae to RFM, a broad spectrum antibiotic such as oxytetracycline (4 pessaries each 500 mg) pessaries should be placed in a sanitary manner into the uterus daily for a minimum of five days. For localized infections as indicated by a foetid discharge, and with systemic involvement as indicated by a high temperature, a therapeutic dose of oxytetracycline should be administered parenterally (8–10 mg/kg) once daily for a minimum of five days. To reduce the frequency of oxytetracycline administration, a long acting (LA) injectable oxytetracycline (20 mg/kg) which gives protection comparable to the administration of a double dose of conventional injectable oxytetracycline repeated on three consecutive days can be used.

Antiseptic solutions can also be used in cases of RFM with no systemic infection. All types of intrauterine antiseptics have a similar inhibitory effects on uterine phagocytosis (Vandeplassche 1982, 1984). The use, for example of hydrogen peroxide is not recommended in cases of RFM because of its severe irritating effects

on the uterus (Roberts 1971).

The administration of 30 IU of oxytocin intravenously twice daily is helpful in stimulating uterine contractions when given within 24 hours of the birth of the calf particularly in cases of retention which are due to primary uterine inertia. Oxytocin has no effect on the uterus after 24 hours of birth because it requires priming by oestrogens.

Oestrogenic substances increase sensitivity of uterine musculature to oxytocin and boosts the anti-infective properties of the endometrium especially phagocytosis. Stilboestrol dipropionate and oestradiol monobenzoate can therefore be given during the first three days after calving in order to boost uterine defence mechanisms and prime uterus to oxytocin. Oxytocin can then be given within 4-8 hours after oestrogenic administration in order to enhance uterine contraction.

Prolapse of the uterus

This condition occurs most commonly during the third stage of labour, within a few hours of the expulsion of the calf but occasionally up to several hours afterwards. Diagnosis is easy because the symptoms are obvious. Treatment of this condition is aimed at replacement of the everted uterus. Replacement is started by wrapping the prolapsed uterus in a large clean towel or other suitable material to prevent further contamination. If the cow is standing the uterus should be supported by a large towel/sheet held by assistants on either side. A preliminary injection of calcium borogluconate (as for milk fever) should be given and rumenal tympany should also be relieved if present by passing a stomach tube or simply by use of a trocar and canula. Then 8-12ml of a 2-2.5% local anaesthetic solution should be given epidurally. The epidural anaesthesia relieves both continuous straining and defecation. Thereafter the everted uterus is washed with warm normal saline solution or with water to which a small amount of mild antiseptic solution has been added. If the foetal membranes are already detached and their complete removal can be carried out easily this should be done. Otherwise the uterus is replaced with the membranes still adherent. If the urinary bladder is within the prolapsed uterus, it should be emptied by use of a catheter. Cream or ointment containing a mild antiseptic or antibiotic can be gently applied on the cleaned uterus. The uterus is then replaced in a gentle aseptic manner and to ensure complete replacement 9 liters of clean warm saline are delivered into the uterus by gravity and immediately removed by siphonage. Thirty international units of oxytocin should be administered intravenously to contract the uterus if it is within 24 hours of calving. The vulval lips can be apposed by use of Flessa needle or Bühner suture pattern and the sutures should be removed after 10 days at the earliest.

Puerperal infection

Puerperal metritis occurs within a few days of parturition. It usually follows an abnormal first or second stage of labour; it is associated with uterine inertia and is frequently accompanied by retention of the foetal membranes. The infecting organisms includes streptococci, staphylococci and coliforms. Affected animals show both a local and general symptoms. There is a foetid, reddish serous, vaginal discharge accompanied by frequent expulsive straining efforts. Commonly tocaemia, septicaemia and pyaemia occur. The handling of a case of puerperal metritis calls for a humane and conservative approach. This

approach is described in a later section of this paper.

In the first two weeks after calving, before normal oestrous cyclicity resumes, the ovaries produce minimal amounts of oestrogen or progesterone. The uterus of cycling cows is highly resistant to non specific infections during oestrus. A study by Gunnik, (1973) demonstrated that permeability of uterine epithelium during proestrus and oestrus allow microorganisms to pass through easily and quickly activate the leucocytic system. This is then followed by a rapid mobilization of neutrophilic leucocytes entering the endometrium and uterine cavity in great numbers within 4 hours after the infection. Due to "higher" intrauterine pH in the oestrogenic phase as compared to the luteal phase, the growth rate and especially the production of toxins (haemolysins) are decreased. The beneficial effects of oestrogen are lacking during the acyclic period of early postpartum. Infections in the uterus during this period easily gain foothold.

(b) Phase between Week 2–4 after calving

In normal cows, the reproductive tract is partially located in the pelvic cavity at 14 days after calving and often can be retracted by manipulation per rectum. The cervix is about 6–8 cm in diameter but is significantly larger in multiparous cows. Both uterine horns are palpable in primipara and many multipara. The previously gravid horn has larger diameter at this time. Both ovaries are palpable. Often a few follicles with diameter >1 cm may be found. The ovaries can be small and inactive.

Puerperal metritis

Cows with puerperal metritis at two weeks postpartum have a foetid, reddish serous or purulent vulval discharge with a foul-smell as opposed to the normal odourless lochia. A thin walled uterus containing an excessive amount of foetal fluid at this time indicates puerperal metritis. Manipulation of such a reproductive tract should be minimized to help prevent perimetritis and salpingitis. Puerperal metritis is a serious disease of this phase. It is a result of persisting pathogenic bacteria acquired early in the puerperium. Shortly after calving the uterus is exposed to a broad range of bacteria originating from the environment, vagina, the vestibule and the perineum. The bacterial flora of the uterus may in such cases of puerperal metritis include an increased number of anaerobic and putrefactive bacteria besides those found at normal involution. Even in cows with normal parturition up to 90% may acquire some form of uterine infection during the first two weeks after calving (de Bois 1961; Elliot et al. 1968). Husbandry and sanitation practices commonly employed for dairy cows which normally calve in continually occupied stalls favour bacterial contamination. Usually such an infection follow dystocia, or other postpartum conditions such as traumatic lesions of the uterus, cervix and the lower genital tract which promote bacterial invasion into the uterus. The uterine flora during early puerperium comprise a large number of species. Two studies by Griffin et al. (1974) and Elliot et al. (1968) showed that there was a decrease in the rate of bacterial contamination from more than 90%, early in puerperium to 9% at 45 – 60 days postpartum. As addition, their results are shown in Table 1. Other studies (de Bois 1961; Griffin 1974; Hartigan 1974) showed that the composition of the flora is not persistent but varies considerably in consecutive samples from the same individual as a result of spontaneous

contamination, clearance and recontamination. A mechanism of elimination or decreased bacterial invasion after two weeks from calving markedly reduces the infection rate.

Acute puerperal metritis after calving, can occur with or without the retention of the foetal membranes. Cows with such an infection should be examined in a sanitary manner to determine the source of the infection. Some cases of puerperal metritis can retrospectively be traced to unsanitary assistance at the time of calving. The bacterial contamination at calving results into a massive bacterial growth in the uterine lochia and may provoke an inflammatory reaction of the uterine wall with different clinical manifestations. It may pass subclinically, which is the most common, or cause an acute puerperal metritis or a chronic endometritis, in some cases persisting beyond the next period of breeding.

Treatment to cows which have developed puerperal metritis should be directed at overcoming the effects of septicaemia and toxaemia. For treatment, when the vagina is not affected and the cervix is patent, careful siphoning of intrauterine contents through a soft rubber tube after instillation of normal saline containing a suitable antibacterial agent i.e. flushing is recommended (Sloss and Duffy 1980). Care should be taken not to introduce large amounts of fluid i.e. douching which could lead to passage of organism from the uterus to cause peritonitis. This may be followed by intrauterine infusion of a smaller quantity of an appropriate antibacterial preparation. The use of intrauterine antibiotic should be undertaken with great care because antibiotics reduce uterine defence mechanisms. Systemic antibiotic cover should be given using lower side of doses of penicillin, tetracyclines or trimethoprim with sulphadoxime. Again, long acting formulations are to be preferred to reduce the frequency of injection. Supportive treatment in the form of intravenous or oral electrolyte replacers and vitamin B complex preparations should be initiated as early as possible. Other forms of treatment of puerperal metritis include the use of prostaglandins alone or in combination with either systemic antibiotics or intrauterine disinfectants such as Nelex® and a combination of oestrogens, oxytocin and antibiotics.

(c) Phase between Week 5–6 after calving

In normal cows, the reproductive tract at this period is located in the pelvic cavity in all primipara and most multipara. The cervix is firm with uniform diameter. Usually multiparous and cows with periparturient disease have slightly larger cervices than primipara and normal cows at this stage. The previously pregnant and non pregnant uterine horns are almost equal in size. The lumens of both uterine horns should not be palpable in normal cows at this period.

Cervicitis, Endometritis and Pyometra

All cows between five and six weeks after calving should be examined to establish if infection is present and whether the is cow has started normal oestrous cyclicity. Commonly encountered disease conditions at this stage include cervicitis, delayed uterine involution, endometritis and pyometra. But subtle involutionary changes and chronic endometritis may be difficult to detect at such an examination. Finding of an enlarged external cervical or indicates prolapsed cervical rings or cervicitis that can be secondary to metritis. A palpable uterine lumen is an indication of delayed uterine

Table 1: Incidence of positive samples

Infection rate (%)	Days postpartum 1–14	16–30	31–4	45–60	Reference
Study 1	90	–	25	9	Griffin, 1974
Study 2	93	78	50	9	Elliot, 1968

involution probably due to endometritis. Careful rectal palpation, vaginoscopic examination and bacteriological examination of the uterine discharge must be carried out. The vaginal discharge should be examined after rectal palpation and visual inspection for signs of abnormal discharge or inflammation of the vagina and cervix with the aid of a speculum is often beneficial. Any cow found to discharge purulent or foetid discharge or cloudy mucus during oestrus should be treated. Cows found to be affected with chronic endometritis can be infused with intrauterine mild irritant disinfectants such as 2% Lugol's iodine solution. Routine uterine infusion of mild disinfectants to non cycling cows is contraindicated. Best results after intrauterine infusion are obtained in cycling animals. This is because, in absence of cyclicity, infusion inhibits uterine defence mechanisms. When available, prostaglandin therapy administered intravulvo-submucosally (Chauhan et al. 1984) to contract and evacuate the uterus is to be preferred regardless of absence or presence of a functional corpus luteum. Such treatment will reduce the number of days to service and the number of services necessary per conception (Moorow 1988). Since some cows do not respond to the first treatment, it is advisable to re-examine the cows 10–14 days after the prostaglandin injection and re-treat the animals if necessary. Long lasting cases of endometritis and pyometra could be complicated by inflammations and adhesions of the uterine tubes and ovarian bursa.

Silent oestrus

At five to six weeks after calving, normally cows are supposed to have resumed oestrous cyclicity. Also silent oestrus is common during this phase. Silent oestrus occurs when cows are cycling but no visible oestrus signs are externally exhibited. The herdsman or livestock owner might observe standing oestrus in a very small proportion of cows. In herds where the cows are in good body condition, the greater proportion of cows showing "no visible oestrus" are ones in which oestrus has occurred but not been detected. Increasing the frequency of observation of the animals usually improves the rate of heat detection as shown in Table 2. A minimum of one hour per day should be devoted entirely towards observing cows for oestrus signs. Ideally this should be divided into three 30 minute periods occurring at times when the animals are not distracted. More time will be required in larger herds. In herds where the cows are in poor body conditions, there will usually be about equal numbers of anoestral cows and cows that were in oestrus but were not observed or not recorded.

(d) Phase between Week 7–8 after calving

In normal cows, the diameters of uterine horns are about the same size. Structures that can be palpated in such cows includes normal corpora lutea, cystic corpora lutea and cystic follicles.

Anoestrus

Anoestral cows have very small ovaries, without apparent luteal activity, and a small uterus that is lacking in tone. Heifers and young cows are the group most likely to be affected (Fielden et al., 1976). All cows which have not shown signs of oestrus at this time, or those showing abnormal oestrous cycles need to be re-examined. Perhaps it is important to remember that 90% of cases of cows reported to be anoestrus are really due to failure in oestrus observation (Zemjanis, 1969). The most common causes of anoestrus at this phase included pyometra, small inactive ovaries due either to disease, high milk production, insufficient energy intake or a combination of these, a functional corpus luteum due to silent or unobserved oestrus with ovulation and cystic follicles.

Any uterine infection at this stage (post puerperal period) constitute those persisting from the puerperium and infections venereally transmitted. They manifest themselves by clinically detectable lesions of the genital tract, mainly endometritis or by repeat breeding in clinically normal cows. On this examination it possible to estimate the stage of the oestrous cycle by palpating the size and consistency of the corpus luteum when present. Then the owner can be informed when next to expect the cow to come in heat. Alternatively cows with a functional corpus luteum can be treated with a prostaglandin and usually come into oestrus 3 – 5 days after such treatment. They should be bred based on observation of oestrus.

A cheaper and readily available alternative for Tanzania is to shorten the oestrous cycle by use of irritating intrauterine infusions such as weak Lugol's iodine solution. Infusion of irritating preparations might change the duration of the oestrous cycle. There is no change in the duration of the cycle when infusion is done during or near the time of oestrus. The cycle is shortened when disinfectant solutions are infused between days three and nine. There is no change in cycle duration when infused between Days 9 to 14 and the cycle is prolonged for 4 – 5 days when treatment is done between Days 15 to 18 (Ginther 1966: Grunert et al. 1973; Sequin et al. 1974) Disinfectant solution such as 2% Lugol's Iodine should be introduced into the uterus and not into the cervix or vagina as this may be painful to the cow.

(e) Phase between Week 8 to conception

All cows bred three or more times should be gynaecologically examined to find out possible causes of the failure to conceive or maintain the pregnancy. This examination should also included all cows previously declared pregnant but observed in oestrus. Consideration should be given to all factors that can influence fertility such as bull/semen, method of insemination of cows, the conditions of herd management and chance. If Artificial Insemination is practiced, egg and sperm quality as well as timing of insemination must be critically assessed. In herds where natural service is employed, then it regularly happens that the bull is the cause of the failure of cows to become pregnant (Ayalon, 1964; Robert, 1971).

Table 2: Percentage of reproductively normal cows detected in oestrus at the first three ovulations when maintained under two systems of observation.

Observation system	Ovulation First	Second	Third
Continuous	50	94	100
Periodic	[illegible]	44	[illegible]

(From King et al., 1976).

In most of dairy herds in Tanzania, naturalservice is extensively used either exclusively or alternately with Artificial Insemination. Venereal infections with nonspecific bacteria may in certain cases arise from the preputial flora or seminovesiculitis but these conditions appear comparatively rarely. The status of Tanzania dairy herds in terms of specific infectious causes of infertility is yet to be fully documented but existence and spread of *Brucella abortus*, Campylobacter fetus var. venerealis, Trichomonas fetus, and Mycoplasma spp is possible.

The cyclic non breeder cows, can be infused intrauterine with a weak irritating disinfectant solution at the time of oestrus. As an example, is to infuse intrauterine 2% Lugol's Iodine solution (i.e. 2 ml of commercial Lugol's solution per 100 ml of saline) on day 4 or 5 of the cycle (day 1 = day of previous oestrus). Such iodine infusions are particularly useful in Tanzania because prostaglandins are sometimes unavailable or are too expensive. The volume of the infused solution is not critical, since volumes as low as 5 ml Lugol's solution have proved effective in inducing oestrus when given intrauterine. Normally 25 - 50 ml of this mixtures is infused into each horn (Morrow 1986). Breeding on the induced oestrus might improve conception rates in cyclic non breeder cows. If the method is used in clear cases of mild to moderate endometritis but in cycling cows, it is recommended not to breed the cow on the induced oestrus but rather to wait until the next spontaneous oestrus. If bred, cows discharging cloudy mucus, can be infused with a weak disinfectant solution 24 - 48 hours after breeding.

A rectal palpation for the purpose of pregnancy testing should always be conducted at 60 days after breeding to detect non pregnant cows. Cows which have previously been bred and failed to conceive will often pass unnoticed because of inadequate detection of oestrus. This will result in unnecessarily long interval between inseminations and consequently testing should always be conducted at 60 days after breeding to detect non pregnant cows. Cows which have previously been bred and failed to conceive will often pass unnoticed because of inadequate detection of oestrus. This will result in unnecessarily long interval between inseminations and consequently also in unduly long calving to conception interval (Olds, 1969; Esslemont, 1974). Early detection of serviced animals that fail to conceive allows preventive and therapeutic measures to begin promptly and reduced time loss due to delayed conceptions. To avoid long intercalving intervals therefore, all serviced cows should be pregnancy checked 60 days post breeding or earlier depending on the experience of

the veterinarian.

General Discussion

Planed herd health reproductive control program results into high reproductive efficiency. Such a program can detect both clinical and subclinical diseases before they cause serious economic losses. A herd health reproductive control program involves conducting regular and scheduled gynecological examinations of cows. Cows due for scheduled examinations are selected on basis of information obtained from individual cow records. The frequency of regular examinations depends on the size of the herd, the incidence of diseases as well as the pregnancy rate in the herd. Once a month examination of cows will suffice for small herds with all year round calving pattern. However, for larger herds more frequent examinations are necessary.

The success of a herd health reproductive control program depends on the competence of the veterinarian, the level of management of the farmer, the reliability and adequacy of the records kept as well as the enthusiasm with which the veterinarian provides advice and follows up the results of that advice. The initial stages of a herd health reproductive control program concentrates on solving obvious disease or production problems. Wile solving these problems, the objectives of the farmer as well as a clear picture of the production targets should be set. The targets are then compared with the actual performance. Such a comparison often identifies the presence of problems that have interfered with performance. This and the gradual acquaintance of the veterinarian to the particular dairy herd in the program determines are where additional efforts areas should be directed to improve health and production. Success of a herd health reproductive control program os a gradual evolutionary process. The target concept assumes that the primary objective of the farmer is to maintain animal health and production at the most efficient level that will provide maximum economic returns. Often this is not the case and therefore other objectives of the farmer should be put consideration when setting targets in herd health reproductive control program. Targets sets should always take into consideration the production system practiced and the particular production environment.

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