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ACETONAEMIA IN DAIRY COWS
... also known as Ketosis, Acidosis or Sugar Deficiency

By F. C. WILKINSON, B.V.Sc.

ACETONAEMIA is a common disease of newly calved cows in the dairying districts of Western Australia. Affected cows practically dry off and lose a lot of body condition; these are the main causes of loss to the owners.

The disease is marked by a lack of appetite and drop in milk production. It is often accompanied by a sweetish odour in the breath and also in the milk and there may be nervous symptoms.

Without treatment most cows slowly recover their appetite and body condition but do not return to full milk production during the lactation.

CAUSE

The cause of the disease is complex and not fully understood. However it is known that clinical symptoms occur in cows when the demands on their glucose and glycogen resources cannot be met by digestion and body food stores.

Even fat cows are known to have low reserves of glycogen which is the body storage unit for glucose. If there is not enough readily available glucose in the feed supply the body becomes short of this food. The shortage of glucose adversely affects digestion resulting in the formation and uptake of fatty acids and ketones. Combined with this the body attempts to rapidly convert fat to glucose and in doing so produces more ketones.

OCCURRENCE

The incidence of acetonemia is especially high in:

(1) High producing heavily fed dairy cows.

(2) Cows on pasture and not fed enough supplements.

(3) Cows suffering from a specific deficiency such as cobalt and perhaps phosphorus.

(4) Cows fed heavily on silage with a high butyric acid content, commonly called sour silage.

(5) The disease may also be secondary to other diseases such as mastitis, metritis or any digestive upset.

Regardless of the cause, acetonemia is most common during the first month of lactation, less common in the second month and rare near the end of lactation. Cows of all ages may be affected and the disease is not uncommon in newly calved heifers. Acetonemia often recurs in a cow but is not considered a hereditary disease.

SYMPTOMS

Cows affected with acetonemia have a low sugar (glucose) level in the blood and a high ketone level. These conditions cause two main forms of the disease. They are the wasting form and the nervous form. The names describe the two extremes of a range of symptoms of which wasting and nervous signs are present in varying degrees.

The wasting form is the most common of the two and the main symptoms are a gradual but moderate loss of appetite and fall in milk yield over two to four days. The pattern of appetite loss is unusual because the cow first refuses to eat grain and then silage but may continue to eat hay. There may also be a depraved appetite.
Body weight loss is rapid and usually faster than would be expected for the decrease in appetite. The manure is firm and dry but serious constipation does not occur. The cow is moderately depressed and the "hang-dog" appearance and reluctance to move and eat may suggest a mild stomach pain.

A characteristic smell of ketones can be detected in the breath and often in the milk.

Few affected animals die, but without treatment the milk yield falls. Although spontaneous recovery takes about a month (as balance between the drain on lactation and feed intake is established) full potential for milk production during the lactation is not regained.

Nervous signs sometimes occur in the wasting form of the disease but they are rarely more than a few bouts of staggering and partial blindness.

The nervous form of the disease usually starts quite suddenly with the cow in a state of frenzy. The characteristic signs are walking in circles, straddling or crossing the legs, leaning on posts, apparent blindness, aimless movement and wandering, vigorous licking of the skin and other objects accompanied by salivation. The nervous signs usually occur in bouts which last for one or two hours at intervals of about eight to 12 hours. Affected cows may injure themselves during these nervous bouts.

**DIAGNOSIS**

From a consideration of the history of the attack and the symptoms shown, the diagnosis of the diseases is usually not hard.

Acetonaemia should be suspected when symptoms of loss of appetite, rapid wasting, greatly diminished milk yield and constipation occur during early lactation. The characteristic smell of acetone in the breath and the appearance of any of the described nervous signs will be further evidence of the disease.

To help confirm the diagnosis, samples of the urine or milk can be easily chemically tested. A colour reaction in the test denotes a positive result. Test tables known as "Acetest" and a colour chart are available from chemists. A highly positive reaction in conjunction with the symptoms will put the diagnosis beyond doubt. If further confirmation is needed, milk or urine samples can be sent to the Department of Agriculture for testing. About one fluid ounce of the sample is enough and it should be despatched immediately after collection or it may be unsuitable for testing.

Acetonaemia may be a complication of other metabolic diseases such as milk fever, or other complications may be secondary to acetonaemia. In these cases diagnosis is not easy. For instance it is not uncommon to treat a cow successfully for milk fever and find she will not eat because she also has acetonaemia.

**TREATMENT**

Several effective treatments are available for cows, but in some the response is only transient. In rare cases the disease may persist and cause death or necessitate slaughter of the animal. These are mostly secondary and failure to respond to treatment is due to the primary disease.

There are two general forms of treatment, these are:

- To provide the cow with glucose or a glucose forming substance.
- Hormonal therapy: The injected hormones stimulate the formation of glucose from the cow's body stores.

**Replacement Therapy**

A treatment which can be used where there is no veterinary service is to inject a 40 per cent. solution of glucose. (7 oz. of glucose dissolved in 17 fl. oz. of boiling water and allowed to cool). This is injected under the skin, preferably in three or four different places.

Veterinary treatment is to inject large quantities of 50 per cent. glucose; this gives a rapid response. One injection usually causes a marked improvement but relapses often occur unless further treatment is given.

Propylene glycol or glycerine 8 oz. twice daily for two days, followed by 4 oz. daily...
for two days given as a drench (or in the feed if the cow is still eating), give excellent results as they are broken down to glucose in the stomach and become available to the animal. They can be used alone as treatment, but are used to better advantage when given as a follow up to glucose injections.

Sodium propionate also has been given successfully as a follow up treatment to glucose injection in doses of 6 oz. a day. Ammonium lactate 200 grams daily for five days has been used extensively with reported good results.

Hormonal Therapy using injections of cortisone, hydro-cortisone and their derivatives have been widely used by the veterinary profession with or without glucose or its precursors. Their effect is usually dramatic, but as in replacement therapy, relapses do occur.

Chloral hydrate has long been used in the treatment of both forms of acetonaemia. An initial dose of 1 oz. can be followed by ½ oz. doses twice daily for several days. The chloral hydrate is usually given as a drench dissolved in a large quantity of water. Cobalt supplementation combined with replacement or hormonal treatment has often shown to be of value and is worthwhile.

Affected animals should be provided with plenty of food and water during and after treatment.

PREVENTION

It is difficult to make general recommendations for the prevention of this disease because of the many conditions under which it occurs. Generally, cows should not be starved or over-fat at calving. An adequate food intake should be ensured in the early part of lactation, and the ration should contain enough cobalt and phosphorus.

If there is a high incidence of acetonaemia in a herd receiving large quantities of silage, reduce the amount of silage for a trial period.

The preventive feeding of sodium propionate may be considered in problem herds. Four ounces daily for six weeks starting at calving has given good results in reducing the incidence of acetonaemia and improving production.
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