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COBALT
Its Use to Control “Wasting Disease”
By L. C. SNOOK, B.Sc. (Agric.), D.Sc., Animal Nutrition Officer

COBALT is one of the most interesting of the so-called “trace” elements. Particularly is this so to West Australians as the use of cobalt has permitted farmers to rear healthy sheep and cattle where previously this was impossible. Also, it was in this State that Filmer and Underwood carried out much of the fundamental work which led to the discovery of the vital importance of cobalt.

Minute traces of cobalt are essential in the diets of ruminants, that is in the food of animals which chew their cud. Only about one part of cobalt in every ten million parts of dry matter is present in average herbage but this seemingly insignificant trace MUST be present, otherwise sheep and cattle will waste away and eventually die.

Strangely enough, non-ruminants do not need cobalt. Horses and rabbits, for example, will flourish on cobalt-deficient pastures where sheep and cattle are dying. Apparently, cud-chewing animals need cobalt because this element is used by organisms which live in the rumen or paunch. These organisms seemingly build up certain nutrients vital to the welfare of sheep and cattle.

The essential cobalt must be obtained continuously from the diet. Reserves of cobalt which may be accumulated in the liver apparently are of no value. Thus sheep receiving 7 milligrams of cobalt once a week remained in excellent health, sheep receiving 21 mg. once every three weeks were not so thrifty, while others receiving 35 mg. cobalt once every five weeks developed symptoms typical of cobalt deficiency and some died (Lee 1951).

DENMARK WASTING DISEASE
Cobalt deficiency caused serious losses among dairy cattle in Western Australia when the coastal areas of the South-West were developed as group settlements after World War I. “Denmark Wasting Disease,” as it was called, resembled “bush-sickness” which had caused similar losses in New Zealand and which was then assumed to be due to iron deficiency as it was cured by feeding an iron ore called limonite.

Tests showed that limonite would cure Denmark Wasting Disease also, but Filmer (1932) deduced that it was not iron which was needed by the animal but something present along with the iron. Subsequent work by Filmer and Underwood (1935, 1936) clearly demonstrated that the cobalt present in limonite was the curative principle.

Limonite is still used as a cheap practical source of cobalt to prevent “Wasting Disease” but pure cobalt salts are equally effective and, when available, can be cheaper.

AREAS WHERE COBALT DEFICIENCY OCCURS
As far as we know, in this State cobalt deficiency is almost entirely restricted to the coastal areas, specifically to coastal country consisting of sand and limestone. Heavy clays and rich loams grow pasture containing adequate cobalt. Where alluvial silt has been deposited along creeks and estuaries cobalt deficiency is not a problem. The karri soils of the South-West appear to be an exception. In spite of the rich appearance and loamy texture of such soils, the pasture growing in karri country can be seriously lacking in cobalt. The cobalt status of some of the South-West jarrah-redgum country is also low.

Cobalt is not a plant food. This means that excellent pastures can be grown on soils deficient in cobalt. As occurred when “Wasting Disease” was a serious problem in the Denmark area, cattle and sheep could waste away in paddocks containing an abundance of green herbage of apparently excellent quality.
SYMPTOMS OF COBALT DEFICIENCY

Sheep and cattle receiving inadequate amounts of cobalt develop “Wasting Disease.” This is an excellent descriptive name because, in the absence of cobalt, ruminants lose their appetite and waste away. Affected animals become weaker, develop “weepy” eyes, and if not treated will die within three months to two years after symptoms are first noted. Both sheep and cattle often become anaemic.

Symptoms become apparent at any time of the year but are most obvious in the spring and early summer when green feed is abundant. Milk production in dairy cows is seriously reduced and sterility is common. Where deficiency is only marginal, the animals may only appear unthrifty, that is, they will become lean, develop harsh dull coats, and give the appearance of suffering from internal parasites. This unthriftiness may only be obvious among young stock in areas where the adult animals seem to obtain sufficient cobalt for their needs.

This has been illustrated during the last two years where breeding ewes have been taken into coastal areas by dairy farmers. The ewes remained in good health but the lambs were weak at birth, developed “weepy” eyes, and lost the desire to suckle the ewes. The administration of cobalt solution per medium of a spoon quickly restored the appetite, followed by complete recovery.

Filmer and Underwood (1936) in their original paper, give the following hints to assist in determining whether a disease characterised by loss of condition is “Wasting disease”:—

1. Wasting disease occurs in the presence of ample feed, and is most common when the feed is green.
2. Horses are never affected with wasting disease.
3. Young cattle, especially those between six and 18 months, are more susceptible to wasting disease than mature cattle.
4. Sheep, and lambs especially, are more susceptible to wasting disease than young cattle.

Lack of cobalt in the diet can be determined by analysing the livers from suspected animals. As very little cobalt is present in a normal liver, however, special care has to be taken to avoid contamination with foreign material when collecting livers for investigation.

“COAST DISEASE”

This is due to a dual deficiency of cobalt and copper. It occurs typically on the fine coastal sands and limestones developed from windblown shell. Light land further inland (“banksia sands”) can also be affected.

Animals affected with “coastiness” generally die of “wasting disease” due to lack of cobalt before there is time for gross symptoms of copper deficiency to develop.

Treatment.

Limonite Licks.—Selected iron ore (limonite) containing at least 500 parts per million of cobalt is still used as a cheap and convenient source of cobalt for stock. Limonite is the major ingredient of Denmark Lick.

The original Denmark Lick contained linseed meal and di-calcic phosphate along with salt, limonite and bluestone. These ingredients together made a palatable, general purpose lick.

For reasons of economy, however, the Denmark Cobalt Lick now sold has been made more specific. It consists of two-thirds limonite and one-third common salt (plus copper sulphate). If sheep consume one ounce of this lick each week, or cattle one ounce a day any deficiency of cobalt (and copper) should be corrected.

At the present time (June 1954) Denmark Lick costs £17 2s. 6d. per ton (ton lots) at the superphosphate works. A single bag of 112 lb. costs about 19s. and is adequate for 30 cows for two months. Obviously it is sheer folly to run any risk of the serious losses associated with cobalt deficiency when the risk can be eliminated at such little cost.

Farmers can make up their own limonite licks by purchasing the limonite from the superphosphate manufacturers. This costs 25s. per bag of 180 lb. at the works. Where freight charges are heavy and stock salt is available on the property home made licks may prove a worthwhile economy. One ounce of limonite should contain enough for two sheep for a week or for two cows for a fortnight.
Cobalt Salts.—Cobalt chloride and cobalt sulphate can be cheap and convenient sources of cobalt for the farmer. Both salts are equally useful so the cheaper one should be purchased. Commercial salts are now available at rates ranging between 11s. and 14s. per pound. To make up a salt lick with the same content as Denmark Lick it is necessary to mix 2 oz. of cobalt chloride or cobalt sulphate with 100 lb. of stock salt. Thorough mixing is essential and it may be most convenient to dissolve the cobalt in water and sprinkle this over the stock salt before mixing.

Compound Licks.—Cobalt can be supplied in compound licks. The following is an example of a lick suitable for dairy cattle in coastal areas:

1.—Denmark Lick—100 lb. (supplies cobalt and copper).
Stock salt—100 lb.
Bone meal or its equivalent—200 lb. (supplies calcium phosphate).

This lick could be fed to cattle at the rate of 4 oz. per day. It will supply all the minerals at present known to be deficient for stock in Western Australia and should cost no more than 15s. cwt.

On most properties the grazing animals obtain adequate copper through the pasture and a more simple lick may suffice, such as:

II.—Cobalt chloride or cobalt sulphate—2 oz.
Stock salt—80 lb.
Bone meal or its equivalent—120 lb.

This will contain about the same amount of cobalt as Lick No. 1 and should be fed to cattle at the rate of 4 oz. per head daily.

STOCK LICKS ARE OF LIMITED VALUE
Stock licks are of most value when a known amount can be mixed with the food fed to each animal. One can then be certain that the deficiencies of the diet are being corrected. When licks are placed in the field for stock to feed themselves, consumption can be very variable. Some animals will eat far too much, others none at all. Care should be taken to see that the licks are sufficiently palatable to attract all stock without being so tasty that greedy animals eat the lot. Salt is an excellent medium through which to supply mineral supplements. The proportion of salt should be varied to suit local conditions. For example, on many properties in the South-West dairy cows appear to dislike salt during some seasons.

COBALT SOLUTIONS
Commercial cobalt salts can be dissolved in water and sprayed on to hay or the food being fed in the bails. Cobalt salts can also be added to the drinking waters. The amounts to be used can be based on the fact that one ounce of soluble cobalt salt contains enough cobalt for 1,000 sheep or 100 cattle for one week. Use of cobalt in the drinking water presents practical difficulties but on North-West coastal stations, for example, it is often the only method in use.

The necessary cobalt must be added to the drinking water at least once every week. On some stations the required amount of cobalt salt is wrapped up in cloth and placed in the bottom of the drinking trough. The cobalt slowly dissolves and treated water becomes available over a longer period. With experience in the degree of wrapping required this method can give good results. The cobalt salt (and bluestone, if needed) is sometimes packed into a length of copper piping in which several holes have been bored to permit the slow escape of the dissolved salt when the piping is placed in the water trough.

It is sometimes possible to treat storage tanks with cobalt salts. Whichever method is used it should be remembered that one ounce of the soluble cobalt salt will suffice for 1000 sheep or 100 cattle for one week. Thus if it is considered that each sheep will consume about five gallons of water in a week then one ounce of cobalt salt will be required for each 5000 gallons of water consumed.

Drenching.—As the dose must be given at least once a week it is not anticipated that cobalt will be given as a drench except under unusual conditions. Should drenching be necessary, however, dissolve one ounce of cobalt chloride or cobalt sulphate in 1 gallon of rain water. Keep this as a stock solution. For use, dilute the stock solution with an equal volume of rain water. Ten cubic centimetres (10 c.c.) of this dilute solution constitutes the weekly
dose for a sheep. Proportionate doses can be given to lambs or to cattle, according to body weights.

SUPPLYING COBALT THROUGH THE PASTURE

In Britain and New Zealand it is a general practice to correct cobalt deficiencies in the pasture by topdressing with soluble cobalt salts. Cobalt is not a plant food but the traces which do get into the plant are adequate for the animal. In the past topdressing of pastures with cobalt salts has not been recommended in this State but under certain conditions it may be worthwhile. On cobalt-deficient sandy soil near Perth it was found (Rossiter et al. 1948) that topdressing with cobalt sulphate at the rate of 4 oz. per acre resulted in "sound" pasture for two years.

At Glenroy in South Australia, Lee (1951) found that no lambs were lost on heavy black clay which five years previously had been topdressed with 1 lb. of cobalt sulphate per acre. Seventy per cent. of the lambs died from cobalt deficiency on the untreated plots nearby. It seems, therefore, that where valuable animals are kept on highly improved pastures, relatively inexpensive topdressings every two or three years may eliminate the need for continuous treatment of food or water.

As lambs and calves are more susceptible than adult animals the topdressing of paddocks used for the rotational grazing of young stock may be justified. The topdressing of ten acres of pasture around a watering point may likewise safeguard stock grazing over a much more extensive area.

Superphosphate containing 5 lb. of cobalt sulphate per ton can be obtained on special order for an additional cost of about £3 10s. per ton. This would serve to apply 8 oz. of cobalt salt per acre over 10 acres. Many farmers would consider this well worth the cost if for two years or more it saved all the bother of feeding licks or treating drinking water.

Topdressing, also has the important advantage that all grazing animals receive the supplement independant of the rate with which treated water or lick is consumed. Top dressing could not be recommended on calcareous soils but trials will be well worth while on many South-West soil types.

COBALT FOR YOUNG CALVES

Calves in cobalt-deficient country should receive a cobalt supplement from birth. A pinch of Denmark Lick is commonly added to the milk each day. Perhaps a more certain method is to dissolve 1 oz. of cobalt chloride (or sulphate) in a gallon of rain water. Add a teaspoonful of this solution to the feed once a day. When the calves are weaned either make Denmark Lick available, add cobalt to the drinking water or place the young stock on pasture topdressed with superphosphate containing cobalt.

If it is necessary to treat lambs for cobalt deficiency the same solution can be used but one teaspoonful daily will be ample for 10 lambs.

SUMMARY

"Wasting Disease" in ruminants is due to lack of cobalt in the diet.

In Western Australia pastures deficient in cobalt are known only in the coastal areas.

Cobalt deficiency may be corrected by feeding limonite licks, by use of cobalt salts in the feed or drinking water, or by the application of cobalt salts to the soil.

If the ration is deficient in cobalt, ruminants cannot make use of cobalt stored in the body hence a continuous supply in the food is essential.

Cobalt can be supplied to stock in salt mixtures containing limonite or cobalt salts.

Drinking water can be treated to supply the necessary amount of cobalt.

Topdressing pasture with superphosphate containing soluble cobalt salts may be effective under certain conditions.

REFERENCES

J. F. Filmer and E. J. Underwood (1934), ibid., 10, 83.
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