Vitamin A supplements for sheep and cattle

L. C. Snook

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VITAMIN A is essential for the health and wellbeing of all animals and birds. This vitamin is obtained by grazing animals from carotene, an orange pigment present in green plants. When plant material matures and dies, the carotene is quickly destroyed by sunlight. This means that dry herbage in the field becomes worthless as a source of Vitamin A.

Farmers appreciate these facts, hence it is natural that during the long dry summer concern should be felt for the welfare of stock on dry feed. If by any chance ewes fail to conceive, weaners cease to thrive, or heifers fail to come into oestrus, then the possibility of vitamin A deficiency immediately comes to mind. In many cases, rather than run any risk, farmers buy commercial vitamin A preparations. This may be a commendable precaution but the supplements are costly and when stock have to be yarded and drenched, the extra work is considerable. It is worthwhile, therefore, to give careful consideration to the likelihood that grazing animals in the farming areas of Western Australia already obtain plenty of vitamin A from the foodstuffs normally available.

VERY LITTLE IS NEEDED

It is surprising how little greenstuff is needed to supply the needs of an animal. One pound of fresh green grass each day contains enough carotene to provide all the needs of at least 50 sheep or five milking cows. In other words, so long as animals obtain a mere nibble of greenstuff there will be no lack of vitamin A. This "nibble" of greenstuff is available over a far longer period than many farmers realise. On most properties there are areas of rough country carrying perennial shrubs, "suckers," and trees which keep green throughout the summer. The foliage may be unpalatable but an occasional leaf will go close to satisfying the animals needs for carotene. The various acacia shrubs, for example, may be harsh and thorny but towards the end of summer most of these will have been thoroughly pruned by grazing animals.

In many favoured areas, native and introduced pasture plants survive well into the summer. These may not give an appreciable bulk of feed but will certainly eliminate all need for the purchase of vitamin A supplements. The shrubs which persist in salt-lake country along with the top feed of pastoral areas provide similar service as reservoirs of carotene.

VITAMIN A MAY BE STORED

Even on the unusual farm where everything green has been killed or eaten out, it is unlikely that vitamin A supplements will be needed. Grazing animals protect themselves against hard times by storing considerable quantities of vitamin A in their livers. After a month or so on abundant green winter pasture adult sheep and
cattle should have enough vitamin A in reserve to last for at least six months, even on a diet completely devoid of carotene. Peirce (1954) found that ewes had to be kept in pens on deficient rations for 16 months before the blood concentrations of vitamin A became significantly depressed. It seems that breeding ewes on a deficient diet have to be carried into their second pregnancy before the health or vigor of the lamb is affected.

It is unlikely, however, that grazing animals will be entirely dependent on liver reserves during the summer months. Good quality cereal hay, for example, can supply all the needs of sheep and cattle of all ages. Silage is a rich source of carotene and if made available to stock in the late summer months would eliminate any fear of vitamin A deficiency.

Cereal grains in general are poor sources of carotene. Even so, in Western Australia it is unlikely that stock will be fed on grain alone for periods sufficiently lengthy to produce vitamin A deficiency. In a drought feeding trial (Sims and Webb, 1946) carried out in the Victorian mallee, Merino ewes were kept in a small bare paddock for eight months. They were kept alive on wheat-grain fed twice weekly at the rate of 0.9 lb. per head daily. On this meagre ration the ewes were mated and reared 51 per cent. lambs. Such losses as did occur could be attributed to lack of food rather than to lack of vitamins. The willingness of ewes to mate and the ability to conceive is not reduced even in extreme vitamin A deficiency.

To produce healthy lambs, however, about two to three milligrams of carotene or vitamin A is required by the ewe each day. This must be obtained from the food or from the liver reserves. Foods in common use have been found to contain the following amounts of carotene—

<table>
<thead>
<tr>
<th>Fodder</th>
<th>Milligrams of Carotene Per Pound of Food.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh green clover</td>
<td>200-350</td>
</tr>
<tr>
<td>Fresh green grass</td>
<td>170-290</td>
</tr>
<tr>
<td>Clover silage</td>
<td>60-80</td>
</tr>
<tr>
<td>Oaten silage</td>
<td>6-36</td>
</tr>
<tr>
<td>Clover hay</td>
<td>1-16</td>
</tr>
<tr>
<td>Cereal hay</td>
<td>Negligible -6</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>Negligible -0.6</td>
</tr>
</tbody>
</table>

(1) Peirce (1946).
(2) Underwood and Curnow (1944).

The data in this table indicate that the provident farmer should be able to conserve fodder sufficiently rich in carotene to eliminate all fear of vitamin A deficiency in sheep and cattle.

LOCAL EXPERIMENTS

The above evidence may seem somewhat theoretical, and the practical man may be more convinced by the results obtained in an experiment carried out at the Wongan Hills Research Station in 1954. The summer of 1953-54 was a dry one, no green feed being available in the paddock from early November until the end of May. On February 18, 1954, 200 mated ewes were run through a race and ear tagged. Each alternate ewe received half-a-million international units of Vitamin A per medium of a drenching gun. The ewes received dry paddock grazing plus oat grain at the rate of 1 lb. per head daily (fed three times per week.)

The two groups were separated prior to lambing. Details concerning the trial have been summarised in Table I.

<table>
<thead>
<tr>
<th>TABLE 1.—LAMBS BORN AND TAILED 1954.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Groups</td>
</tr>
<tr>
<td>Groups Receiving Vitamin A.</td>
</tr>
<tr>
<td>(100 ewes) (100 ewes)</td>
</tr>
<tr>
<td>Number of lambs identified and weighed</td>
</tr>
<tr>
<td>Average weight at birth (lb.)</td>
</tr>
<tr>
<td>Unidentified lambs found dead</td>
</tr>
<tr>
<td>Number of lambs tailed</td>
</tr>
<tr>
<td>Average weight at tailing (lb.)</td>
</tr>
</tbody>
</table>

It was unfortunate that there were so many non-pregnant ewes in the line selected for the trial. The results do not suggest, however, that the vitamin A supplement was of any value in increasing the birth weight or viability of the lambs, or in stimulating growth rates.

WEANERS

Unthriftiness in weaners is a serious problem in parts of Western Australia. Lack of vitamin A has been listed as one of the likely causes of this unthriftiness. Significantly, however, the problem appears to be most serious in the lower Great Southern areas where, for reasons already discussed, one would least expect a prolonged lack of carotene in the diet. The unthriftiness of the weaner is much more
likely to be due to poor milk production by the ewe and/or to poor quality paddock feed.

It should be remembered that colostrum is rich in vitamin A and if the ewe is in good fettle the lamb should be able to build up useful liver reserves, even if born late in spring. These lambs may have to be weaned onto dry feed but the requirements of the weaner are no greater than those of the pregnant ewe. Young animals should obtain adequate supplies of carotene from the conserved fodders normally available. If weaners do benefit from vitamin A supplements this suggests faulty animal husbandry rather than that weaners in general require additional vitamin A. Of course, under drought conditions where weaners have to subsist for months on bleached roughage with or without cereal grain, the use of supplements rich in carotene or vitamin A could reduce losses.

Even under these extreme conditions, however, the provision of extra food could be of more importance than extra vitamins. Good quality hay with a tinge of greenness will supply both the food and the carotene.

In 1954 at the Wongan Hills Research Station an experiment was carried out with 50 crossbred weaner wethers. On February 22 the animals were weighed and each alternate one was given 500,000 international units of vitamin A. The sheep were then placed in a paddock containing dry subterranean clover and dry annual grasses. Oat grain was supplied at a rate of 1 lb. per head daily. The changes in body weight are recorded in Table II.

<table>
<thead>
<tr>
<th>Date</th>
<th>Control Group</th>
<th>Vitamin A Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/2/54</td>
<td>81.9</td>
<td>82.5</td>
</tr>
<tr>
<td>29/4/54</td>
<td>82.2</td>
<td>84.2</td>
</tr>
<tr>
<td>31/5/54</td>
<td>87.6</td>
<td>89.3</td>
</tr>
<tr>
<td>Gain for whole period</td>
<td>5.7</td>
<td>7.3</td>
</tr>
<tr>
<td>Gain over last month</td>
<td>5.4</td>
<td>5.6</td>
</tr>
</tbody>
</table>

All the animals remained in apparent good health and condition, although there was no green feed for almost seven months. The leaves were stripped from a few Casuarina shrubs in the paddock and these could have nullified the effect of the vitamin A supplement. The overall changes in bodyweight do appear to favour the supplemented group but the difference would be of little significance in practice. During the final month on dry feed, when one would have expected the deficiency of vitamin A to exert its maximum effect, both groups showed a similar increase in body weight.

**RAMS**

In pastoral areas where low lambing percentages have become a serious problem, the suggestion is often made that lack of greenfeed may be reducing the fertility of the rams. Here again it can be stressed that the semen quality of rams is not likely to be affected until the rams have been kept for four months or more on rations practically devoid of carotene or vitamin A. If the animal can get an occasional mouthful of green "top-feed" or a few green shoots from spinifex tufts, this should suffice to maintain the vitamin A reserves at an adequate level. Lack of vitamin A will cause nightblindness in a ram before it will affect the quality of the semen. It should be a simple matter to find out if the rams are "night blind." On a moonlight night, or at dusk, drive the rams through an area containing logs or stumps or boxes. If the rams avoid these obstacles quite easily in dim light, it is most unlikely that lack of vitamin A has affected fertility. Perhaps this statement should be qualified to the extent that if the potency of a ram has been reduced by lack of vitamin A it may take two months on a diet rich in carotene to restore the semen quality to normal. In other words, the night blindness could be corrected before fertility was restored in a ram which had been kept on dry—really dry—feed for more than six months.

**SUMMARY**

Where grazing animals have access to green feed over the winter months it is unlikely that vitamin A supplements will be required during a normal dry summer in the agricultural areas of Western Australia. After a month on green feed the vitamin A conserved in the liver is sufficient to supply the total needs of grazing animals for many months.

On most farms the foodstuffs normally available to grazing animals supply some...
carotene, even during the summer months. Only under extreme conditions will stock have to depend entirely on liver reserves.

Silage can be a rich source of carotene. Hay which is cut and conserved so as to retain a green tinge will supply adequate carotene to sheep and cattle of all ages.

Unthriftiness in grazing animals during the summer months is more likely to be due to lack of good food in general, rather than to lack of vitamin A in particular.

Under the conditions which apply in the Western Australian agricultural areas it is unlikely that the breeding efficiency of rams or ewes will be reduced by lack of vitamin A.

REFERENCES

ACKNOWLEDGMENT
The experimental work to determine the value of vitamin A supplements at the Wongan Hills Research Station was carried out under the direction of Mr. A. F. Smith, Agricultural Adviser, who at the time was Acting Manager at the Research Station.
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