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Cover Page Footnote
The author is indebted to Mr. Geoff. Douglas and Mr. Bruce Woodfield of the Vermin and Noxious Weeds Branch of the Victorian Department of Crown Lands and Surveys for much valuable assistance and for giving him the opportunity of seeing this work at first hand.
Poisoning Rabbits from the Air

by C. D. GOODING, B.Sc., (Agric.)

Aerial baiting gives spectacular kills of rabbits in country which cannot be effectively treated by conventional means, and has been widely adopted in New Zealand and other States in Australia. Here Mr. Gooding reports on developments in aerial baiting in Victoria, and suggests practical applications in Western Australia.

Aerial poisoning has gained a large following in Australia during the last few years following a successful introduction in New Zealand in June, 1949. At that time the use of aircraft in Agriculture by New Zealand farmers was generally further advanced than in Australia, so it was not surprising that the original development took place in that country.

The interest taken in Aerial Baiting in Australia dates from the time when Mr. B. V. Fennessey of the C.S.I.R.O., Wildlife Survey Section, reported in March, 1957, on a visit to New Zealand. A delegation headed by the Victorian Minister for Lands and including several representatives of farmer organisations and departmental officers interested in rabbit control then visited New Zealand and returned.
impressed with this method of controlling rabbits.

Farmers from the Averal and Strath Creek areas of Victoria, in collaboration with the appropriate departmental officers initiated a trial baiting in June, 1959. This was followed by larger trials in July in the Yea district in Victoria. These proved so successful and the pressure for further work was so great that the Victorian Lands Department instituted experimental work to assess such important points as:—

(a) percentage kill
(b) rate, number and spacing of free feeds
(c) weathering of bait material on exposure
(d) economics of aerial baiting . . . and many others.

Results of these investigations were presented to the last Vermin Control Conference by Mr. B. Woodfield of the Vermin and Noxious Weeds Branch of the Victorian Crown Lands and Surveys Department.

Both in New Zealand and Victoria carrot is the preferred bait material. Apple is sometimes used but because of the carrot's palatability to the rabbit, its texture (it does not damage on hitting the ground) its resistance to heat, and its general ease of handling, it is generally preferred to other fleshy baits. Oats is not recommended as a bait because it constitutes a greater danger to stock. Where covering up is not possible (as in aerial baiting) carrot is preferred because it slowly deteriorates when exposed to atmospheric conditions (see section on weathering of bait material).

(a) Percentage kill (carrot):
At the two main experimental sites kills approaching 100 per cent were obtained (95 and 99 per cent.). The officers concerned hoped that at this rate it would only be necessary for aerial poisoning of holdings every second or third year.

(b) Free feeding (carrot):
It was shown that under most conditions two free feeds were adequate when spaced approximately one week apart. The rate of free feed used was 8 lb. per acre.

(c) Weathering of bait material (carrot):
Baits were collected from the treated area at three-day intervals and tested by feeding the rabbits in cages. In one test area the bait became unpalatable after 26 days and in the other area after 19 days. This point is of vital importance since it is not possible to cover each piece of poisoned bait before returning the stock to the area. For this reason it would not be advisable to use a permanent bait medium such as oats.

(d) Economics of aerial baiting:
Following the experimental work an agreement was entered into with the Aerial Operators' Association whereby a guaranteed maximum price of 3s. 5d. per acre within 1½ miles of airstrip, ranging up to 4s. 8d. per acre within five miles of strip would be charged. The farmer was to supply poisoned carrot to the pilot who would then load and spread it.

In practice the total cost of the operation works out at between 5s. and 6s. 6d. per acre, including cost of bait.

Wherever aerial baiting has been used it has caught the imagination of landholders and vermin control authorities alike.

For example, the following table shows the rapid spread in New Zealand:

| TABLE 1 |
| RABBIT POISONING |
|---|---|---|---|---|---|---|
| Hours flown | 1,015 | 1,190 | 1,980 | 3,501 | 2,362 | 3,042 |
| Number of Flights | 2,906 | 4,023 | 7,298 | 14,929 | 11,442 | 15,242 |
| Quantity distributed (tons) | 357 | 514 | 1,313 | 2,787 | 2,719 | 4,817 |

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AERIAL BAITING IN VICTORIA

By the end of October, 1960, approximately 250,000 acres had been treated by aerial baiting in Victoria. This was made up of:

- 105,000 acres treated during 1959.
- 45,000 acres during 1960 until April.
- 100,000 acres 1960 April-October.

Total 250,000 acres

At the moment all aerial baiting is being carried out on areas which cannot be handled by orthodox methods and where vehicles cannot travel. It has, however, been suggested that aerial baiting may eventually become widely used as a standard method of rabbit control.

Aerial baiting developments in Victoria can best be summarised under the following headings:

(a) Airstrips:

The Department of Civil Aviation has laid down regulations about the size and condition of airstrips to be used in this type of operation. These can be summarised as follows:—A strip of land 400 yards x 50 yards over which a car can be driven at 30 m.p.h. is satisfactory for light aircraft such as Moths.

The pilots doing this work can, and often do, use strips much shorter than this. Pilots prefer a strip running up and down an incline, as with such a strip it is possible to use a shorter length of runway. An airstrip adjacent to water for washing up at the end of mixing is an advantage but not essential. The problem of the intense wind erosion caused by the aircraft when it commences its take-off run must be considered, especially as the effect is to leave a bare patch of soil which may form a nucleus for future water erosion.

(b) Aircraft and hoppers:

The most favoured aircraft for aerial rabbit poisoning in Victoria is the Tiger Moth. It is preferred by most pilots because of its reliability and manoeuvrability. Others which have been used are Avro Cadets, Austers, Pipers, Cessnas and Percival E.P.9's. The hourly charges for each type have been calculated bearing in mind payload, running costs, etc., and vary from £20 an hour for a Moth up to £35 an hour for an E.P.9. The standard area treated by a Moth with average dead
flying is 400 acres an hour. This may be increased or decreased by:

1. Amount of dead flying to and from airstrip.
2. Ability of bait cutting and mixing staff to maintain a supply of bait.
3. Methods of loading, hopper construction, flying height, and so on.

The same aircraft hoppers are generally used for aerial baiting as for super spreading, with minor modifications. It was found that bait became wedged in the hopper opening and prevented a free flow. Originally the pilot overcame this by constantly wiggling the release shutter, but this proved unsatisfactory and a propeller was attached to the hopper housing. Driven by the passage of the aircraft through the air this actuates a joggle mechanism inside the hopper, so preventing cavitating and sticking of the bait.

(c) Organisation of work:

The work is organised by a Lands Department Inspector, who visits each farm and arranges for the land to be made available for aerial baiting. If possible, he arranges for all farmers with a specific problem to be treated in one block. The maximum area which can conveniently be handled by a Moth in one block is 9,000 acres, and the minimum to ensure an economical cost to the farmer is 3,000. (At present some smaller areas are being treated, mainly for their publicity value.)

Having once organised the group the Inspector hands over to the aerial operator whose responsibility it becomes to arrange a satisfactory date.

The inspector arranges to have the necessary supply of carrots on hand and personally mixes all bait. This is as far as his duties extend except to maintain a watching brief, and, if he is dissatisfied with the result, to call in the operator and request that the job be repeated at no cost to the farmer.

(d) Operators’ responsibilities:

Having taken charge of the group and arranged for the inspector to supply bait and poison, the operator arranges a suitable commencing date and starts work. It is his responsibility to cut and load all free feed, to cut bait for impregnation and to clean up the site at the end of the operation. For small groups it is customary for an operator to employ a 3-man team—pilot, bait-cutter and loader. The choice of suitable aircraft, landing strip, and so on is the responsibility of the operator. Contracts are signed between the operator and the landholders.

At a combined meeting of the aerial contractors and the Lands Department Officers the State was zoned to avoid overlapping of services. This was a voluntary arrangement to stabilise the price charged, and to set a standard for the service given. (For details see report in “Vermin Control Conference 1960” by B. Woodfield.)

(e) Baits used:

At present carrots are used exclusively. All bait used is grown under gentleman’s agreement between the Lands Department and growers in selected parts of the State. The grower is guaranteed a price of £12 a ton on the farm. It is the inspector’s responsibility to organise supplies of carrot bait.

(f) Bait cutting and poison mixing:

When carrots are delivered on the job the operator sets about preparing them for distribution. First they must be
washed, as they are mostly grown in heavy soil country. There are several types of machine used to cut the carrots into suitably sized pieces. One operator has imported a machine developed in New Zealand which cuts the carrots and impregnates them with poison in one operation. This machine which cuts a relatively small uniform bait, is quick and ideally suited to aerial work.

Most of the smaller contractors hire cutters from the Lands Department. These are relatively cheap, simple machines powered by 1 or 2 h.p. petrol engines. These cut about a bag of carrots a minute.

The size or shape of the bait seems to have little bearing on the results achieved. It is reported that the smaller baits are usually eaten first.

Poison mixing under this system is carried out in a motorised cement mixer, the poison being sprinkled in from a shaker. Poison mixing is always the bottleneck in the process, and it is intended to speed up this section of the work by the use of a pressure spray device.

(g) Areas treated:

Some of the areas treated successfully from the air deserve description, so that they may be compared with similar areas which may be considered for treatment in Western Australia.

Derinillan district:

Situated in some of the best sheep country in the Western Districts, this area is one of the last strongholds of commercial trapping in Victoria. Trappers concentrate on what is called the "stony rise country." Western Victoria possesses some relatively recent volcanoes and some still discernible lava flows. These lava flows, up to 20 or 30 ft. high, are now in the process of weathering and in so doing have produced low boulder-strewn ridges. The stones range in size up to two or three feet in diameter and are so thick that no vehicle can traverse these areas, which may be half a mile wide and up to 30 miles long. Frequently the ridges are separated by narrow valleys, usually about 100 yards wide. There is ample feed among the stones to provide a good medium for rabbit reproduction, and the

Omeo, in the foothills of the Southern Alps. This is typical of the country now being treated from the air.

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You can't beat 'slip' completely...

WHEEL SLIP IN TRACTOR OPERATION

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cover provided is perfect. (An interesting fact is that this land is regarded as some of the best in a very rich district. This is probably because the soil is volcanic in origin and comparatively very young.)

The only way of traversing this type of country is on foot or horseback. Drawing a furrow is impossible.

One of the properties being treated (owner, Mr. Austin—a descendant of Thomas Austin of Barwon Park, who introduced the rabbit to Australia 100 years ago) containing a lot of this stony rise country was used extensively for trapping and in two years, 132,000 rabbits were taken from the 6,000 acre property.

**Swifts Creek:**

Swifts Creek is a small but relatively rich area of farmland situated on the southern edge of the Australian Alps. The area is predominantly used for grazing and from Swifts Creek and Omeo (slightly higher up the Alps) come many of the store cattle fattened in Gippsland before marketing. Farm sizes at Swifts Creek vary from 300 to several thousand acres. The smaller properties have river flats exerting some annual controlling influence) and trail baiting on the hill slopes where a furrow can be drawn. Much of the country being aerial baited is similar to the Blackwood Valley near Nannup. Steep hills, some fallen timber, some part cleared country, all make for difficult rabbit control unless aerial baiting is practiced.

**Longford Pine Plantation:**

Here 8,600 acres of pine plantation were treated along the firebreaks for a cost of 10d. per acre. Reasons for treatment were:

1. Rabbits attacking pines
2. Rabbits reinfecting neighbouring properties
3. Wallabies ring-barking pines.

This area is very similar to some of the light land being planted with pines in the south-west coastal country of Western Australia. The company which owns this plantation now has 60,000 to 70,000 acres under pines in the Gippsland area, and in future will clear all new land of rabbits by aerial baiting before planting. (See possible application in W.A.).

**Mt. Elephant area:**

Green grass is now growing over the Mt. Elephant experimental area, once so eaten out by rabbits that pasture growth was almost prevented. Local farmers agreed that the kill obtained in the initial experiment was 100 per cent. Some six months after treatment there was still no sign of rabbits on the Mount. (The hill itself is fenced off from adjoining farms). There has, in the past, been considerable

along the Mitta Mitta and produce good quality lucerne hay and other crops. The hilly country is used exclusively for grazing. Land values vary from £15 to £30 an acre on the hills, where 1½ sheep an acre are carried. The stocking is approximately 50 per cent. cattle and 50 per cent. sheep. The green feed period here is almost continuous.

Rabbit control measures used at present are myxomatosis (which seems to be
water erosion on the slopes, and it will be interesting to see whether this continues now that rabbits have been controlled.

(h) Laying methods and coverage obtained:

The Lands Department has laid down minimum quantities of free feed and poison to be laid. These are respectively 5 lb., 6 lb. and 7 lb. of carrots per acre. Baits average 200 to the pound, so these rates are equivalent to about one poison bait to every $\frac{3}{4}$ square yards (or including free feeding, about one bait a square yard.)

Bait is generally cut on the back of a truck and falls into a cement mixer for impregnation. The cement mixer is placed over a tarpaulin which must be removed, washed and the washings buried before the operator leaves the site. Bait is loaded into the plane by either a front-end loader attached to a truck (as is used in loading superphosphate) or by bags from the tray of the truck.

The aircraft flies at 100 to 200 ft. and at this height it is claimed that a full coverage can be obtained with little if any overlap and practically no blank strips.

One of the advantages of aerial baiting over ground baiting with a trail is the increased percentage kill (see next section). This is due mainly to the fact that the whole of the rabbits' normal feeding area is "saturated" with bait. The problems associated with one rabbit keeping another from the furrow, or a section of the furrow being cleaned out before the late-comers have arrived and bad placement of furrow in relation to feeding grounds are all overcome by "taking bait to every square yard" and to every feeding area.

(i) Kills obtained:

So good are the results usually obtained that the authorities consider that if the kill obtained does not approximate 95 per cent. the work can be considered as a failure. A good figure from conventional baiting would be 90 per cent. When assessing a "kill" the important rabbits are not those killed, but those which remain to breed replacements. Thus a 90 per cent. kill (10 left per 100) is only half as good as a 95 per cent. kill (five left), whilst a 99 per cent. kill (one left per 100) is five times as good as a 95 per cent. kill.

The two experimental site kills have been estimated at 99 and 100 per cent. whilst the previous year's experiments yielded 95 to 100 per cent. kills. The Derinillan baiting is also reported to have been an overwhelming success.

The effect of aerial baiting on native fauna has not been severe, except at Longford, where the baiting was designed partially to poison wallabies. The Fish and Game Department in Victoria is pleased with the results and although watching trials with interest has apparently found no cause for alarm.

(j) Economics:

It seems that aerial baiting is only economically sound because of the high kills obtained. If the level of kill were to be reduced for 95 to 80 per cent. there would be a residual population four times as large, and aerial baiting would be required every year. Farmers with whom this work was discussed were of the opinion that if treatment were required every year it would not be economically sound. An important factor in increasing the efficiency of the kill is that generally a whole block of country is treated simultaneously resulting in a partial "killer" scheme. Also, comparing the value and productivity of the land being treated with land in W.A. it is clear that the land itself is usually a more highly valued asset than it is in this State. Consequently, farmers are prepared to outlay more money to protect their asset, especially when they can see their money coming back in increased returns in a relatively short period.

Most of the aerial work carried out to date has been in solid farming areas established for some time, where the landholders are financially secure. It would be interesting to see if the reaction of the landholders in the poorer areas is as favourable as those in the wealthier districts.

POSSIBLE APPLICATIONS IN WESTERN AUSTRALIA

There are numerous localities in W.A. where aerial baiting could be used to advantage. These include such places as the Darling Scarp, coastal country, inaccessible swamps, lake margins and steep, hilly and part cleared country along the
Blackwood River. However, in all of these areas the economics of the operation would need close scrutiny before work was commenced. Of the places listed, the Darling Scarp, coastal country and Blackwood Valley would not warrant further consideration (economically) as the areas are only partially developed and the costs of the operation could not be recouped easily from the land. However, the lake margins and swamps could be a different proposition if they were surrounded by high yielding land, which was constantly being infested from such trouble spots.

One other possible application deserves serious consideration. The Forestry Department plants several hundred acres of pines each year. Before planting the Department employs A.P.B. units to poison, then follows up with a second poisoning, fumigation, warren destruction, trapping and dogging all within a temporary netting fence. The costs of complete rabbit clearance by orthodox methods before planting in Victoria vary from 10s. to 15s. per acre. If the costs of manual clearance here are roughly comparable aerial poisoning could almost certainly be carried out more cheaply, and leave forestry workers free to engage in other work. The major problems would be the small size of the area to be treated (500 acres) and locating suitable landing strips. It may even prove practical for the Forestry Department to clear a permanent strip near the centre of its operations for use in the years ahead. (This would also serve as a firebreak.)

**FUTURE RESEARCH**

In Victoria it is proposed to try different base baits and to attempt poisoning with only one free feed. Results of previous work indicate that this may be effective. No research work on aerial baiting is planned for Western Australia at present, and Victorian work is being closely followed.

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**REFERENCES**


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**COVER PICTURE – Beans at Carnarvon**

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