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# VACCINES AND VACCINATION



By C. R. TOOP, B.V.Sc.  
Chief Veterinary Surgeon

**M**ANY of the infectious diseases occurring amongst livestock may be prevented by vaccination. The vaccines used for this purpose are usually prepared from cultures of the organisms causing the disease which are killed, and detoxified and so rendered harmless, by the addition of formalin.

When injected, these vaccines stimulate the formation of protective substances known as antibodies in the blood and tissues of the inoculated animal, conferring upon it an immunity which enables it to resist the disease when subsequently exposed. An immunity produced in the animal body in this way is referred to as an active immunity. An interval of about 14 days elapses before it becomes effective, but it endures from several months to a year or longer.

This immunity wanes with the passage of time, and in order that it may at all times be maintained at an effective level, annual inoculation is recommended.

The ability of vaccines to stimulate the formation of antibodies is variable. With products like botulinus toxoid and tetanus toxoid, it is of a high order, whereas with



Fig. 1.—Using an automatic vaccinator to inoculate a sheep with entero-toxaemia vaccine

entero-toxaemia vaccine, two injections separated by an interval of three to four weeks may, in some circumstances, be necessary in order to obtain adequate protection.

Among the vaccines in common use in Western Australia the following may be mentioned:—

Botulinus toxoid—for the prevention of botulism (toxic paralysis) in sheep and cattle.

Enterotoxaemia vaccine—for the prevention of infectious enterotoxaemia ("pulpy kidney") in sheep.

Tetanus toxoid—for the prevention of tetanus (lockjaw) in horses, cattle and sheep.

Blackleg vaccine—for the prevention of blackleg in cattle and sheep.

Black Disease vaccine—for the prevention of "swelled head" in rams.

Live vaccines, composed either of living viruses or bacterial cultures, may also be used as immunising agents. "Scabby mouth" vac-



cine, used for the prevention of contagious pustular dermatitis ("scabby mouth") in sheep, is an example of a virus vaccine. It is applied to the scarified skin of the thigh, and provided a satisfactory "take" is obtained, produces a lifelong immunity.

Strain 19 Vaccine consists of a live culture of a lowly virulent strain of the microbe *Brucella abortus*, and is highly effective for the control of brucellosis (contagious abortion) in cattle.

### SERUMS

Serum is prepared from the blood of horses which have been injected with large and repeated doses of vaccines. Following this treatment blood is drawn from the jugular vein, and upon setting, the clear fluid or serum which separates is collected, preserved, and transferred to suitable containers.

This serum contains a high concentration of antibodies, and when injected it confers an immediate immunity against the infection for protection against which it has been prepared.

This immunity is referred to as a passive, or borrowed, immunity, and it disappears as soon as the antibodies contained in the serum are eliminated from the body. In contrast with the enduring active immunity stimulated by the injection of vaccines, it is of very short duration and lasts only from two to three weeks. It is,

nevertheless, of very great value for the prevention of mortality when an outbreak of disease is imminent or in progress, and the time interval is too short to allow of the establishment of an active immunity by vaccination.

Examples of serums in common use are pulpy kidney anti-toxin and tetanus anti-toxin. The latter product may be relied upon to prevent losses from tetanus if injected when a wound is inflicted.

### METHOD OF INOCULATION

The greatest care must at all times be exercised to ensure that vaccines do not become contaminated during use, since failure to observe this precaution may result in mortality from tetanus or some other infection. A number of serious mortalities from tetanus following careless inoculation have been reported during recent years.

Syringes and needles must always be sterilised by boiling before use, and vaccine containers must be covered so as to exclude dust. Vaccine which has been opened but unused at the completion of the day's operations should be discarded.

### INOCULATION OF SHEEP

For preference, sheep should be inoculated in the shearing shed, since this will reduce the risk of contamination by dust to a minimum. In



Fig. 2.—A vaccination team at work. One man holds the sheep, another swabs the site of the injection with methylated spirits, while the third operates the automatic vaccinator



addition, the small holding pens will facilitate catching, and the sheep may be released through the counting out pens as the operation is completed.

When it is necessary to work in the open it will be found convenient to inoculate in a small yard holding about 50 sheep. This can be filled as required from larger yards adjoining it, and confusion will be avoided by inoculating in close proximity to the gate and releasing the sheep into the receiving yard when the injection has been given.

### EQUIPMENT

The following equipment will be required:—

A 20 c.c. "Record" hypodermic syringe or an automatic vaccinator.

Six No. 18 or No. 19 Veterinary hypodermic needles.

A quantity of cotton wool and methylated spirits.

### STERILISATION

Syringes must be sterilised before use. To avoid cracking during heating, the metal plunger must be withdrawn from the glass barrel. Together with the spare needles, the syringe is placed in a vessel of cold water, brought to the boil, and kept boiling for five minutes. Upon cooling, the syringe is assembled, care being taken to handle only the outside of the barrel, the plunger by the stem, and the needle by its butt. This will prevent contamination by the fingers of those parts of the syringe which will come into contact with the vaccine. Such contamination would undo the work of sterilisation. Spare needles should be transferred to a jar of methylated spirits for use as sterilised replacements should the needle in use become damaged or soiled.

A small jar fitted with a lid, which has also been sterilised by boiling, will serve as a container to which vaccine may be added from the bottle as required. This container should be kept covered so as to exclude dust, and the lid should only be removed during replenishment and while the syringe is being recharged.

Some vaccines contain a heavy deposit in which the active ingredient is concentrated, and must be shaken vigorously before the contents of the bottle are removed.

Vaccine and equipment should be placed on a small table or packing case outside the catching pen where they will not be damaged by the sheep, but are within easy and convenient reach of the operator.

For convenience, the sheep should be held in the same position as for crutching, and the injection should be made in an area bare of wool, such as the inside of the thigh or the side of the brisket beneath the forearm. Some operators prefer to inoculate in the standing position using a race, and making the injection behind the shoulder. In shorn sheep this is a simple procedure, but with sheep in the wool the fleece must be parted so as to expose the underlying skin.

The syringe should be filled to the 20 c.c. mark and, depending on the dosage, will then contain sufficient vaccine for the inoculation of several sheep, i.e., with a 5 c.c. dose rate, it will contain enough vaccine for four sheep. Air bubbles should be expelled by gentle pressure on the plunger with the syringe held vertically. The skin at the site of injection should be cleansed by swabbing with cotton wool steeped in methylated spirits.

To make the injection a fold of skin should be taken up between the thumb and forefinger, and penetrated by a thrust of the needle, which should lie just beneath the skin, where it can be felt. Deep penetration should be avoided.

The required dose of vaccine is injected by pressure on the plunger.

### THE AUTOMATIC VACCINATOR

This instrument consists of a small hypodermic syringe or "gun", connected by rubber tubing to a stopper perforated by two metal tubes, which plugs into the vaccine bottle. The rubber tubing attaches to the shorter of these tubes; the longer one serving as an air inlet. The syringe may be adjusted by means of a set screw to deliver the required dose of vaccine, and after the injection is made, it refills automatically. Harness, which enables the outfit to be strapped to the body of the operator, is provided.

Syringes of this type may be sterilised without dismantling. The pumping of boiling water through the tubing and handpiece is the method of sterilisation advised by the manufacturer, but the immersion of these parts in water kept at boiling point for five minutes would obviously be safer.

The automatic vaccinator greatly increases the rate at which inoculation can be carried out, and it is of particular value in large flocks. Since it is connected direct to the bottle in which the vaccine is supplied, it eliminates the risk of contamination by dust, and is safer in the hands of the farmer than the hypodermic syringe.

### EFFECTS OF VACCINATION

Apart from slight to moderate lameness, which may persist for a few days in some animals following treatment, inoculated sheep suffer no ill effects. With some vaccines a firm nodule develops at the site of the inoculation, and a period of months may elapse before it is completely absorbed.

### INOCULATION OF CATTLE

In the inoculation of cattle, the same method as described for sheep should be employed, and during treatment they should be restrained in a crush or bail. The injection may be made at any point beneath the skin, but it is advisable to choose a site where the skin is thin and loosely attached, such as in front of the shoulder or over the ribs just behind the elbow. The skin of the bovine is thicker and more difficult to penetrate than that of the sheep, and a No. 16 needle, which is stronger than the No. 18 needle advised for sheep, is recommended.



Horses should be inoculated beneath the skin of the neck and, to avoid injury, the operator should stand close to the shoulder of the animal when making the injection. With nervous animals a crush should be used or a twitch applied to the nose.

#### **CARE OF SYRINGES AND NEEDLES**

After use, the syringe and needles should be flushed out with cold water and then with methylated spirits, following which the needles may be left in a warm oven overnight to ensure that they dry out completely. Cleaning in this

way will prevent the plunger becoming jammed in the barrel and the needles from becoming blocked, in which case neither would be of any further use, and would have to be discarded. As a further precaution, it is advisable before storing the syringe to remove the plunger from the barrel. With the automatic vaccinator, flushing with cold water and then with boiling water after use is sufficient.

Sterilisation by boiling will, of course, be necessary before this equipment is again used for inoculation purposes.

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#### **ARGENTINE ANTS**

The Argentine Ant Control Committee advises that spraying operations were proceeding satisfactorily in local authority areas receiving attention south of the Swan River. Approximately 4,000 acres have been treated since the scheme began, and many householders have expressed their appreciation of the relief which has followed the treatment of their premises.

Inspections have recently been carried out by entomologists at country centres. Small outbreaks have been dealt with at Manjimup and Yarloop, and investigations at Harvey, Wagerup, Waroona, Katanning and Cranbrook show that work carried out in these areas in previous seasons has been successful, as no surviving ants could be detected.

In order to assist residents in districts north of the Swan River where the major scheme would not operate this season, arrangements have been made for free insecticide to be made available to residents prepared to carry out spraying on a co-operative basis. Where about a dozen neighbours could arrange to treat their premises jointly, an application should be made to the local authority for spray material. Where possible, areas to be sprayed should be bounded by streets or right-of-ways so that when the entire block has been completed the risk of re-infestation would be reduced to a minimum. It was reported that unnecessary delay in approving applications for spray material has occurred due to householders forwarding their applications direct to the Department of Agriculture. In all cases the initial approach should be made to the local authority.

#### **CODLING MOTH**

##### **Outbreaks Eradicated Promptly**

No signs of Codling Moth have been seen at Mullalyup and Nannup for three seasons and it is now considered that the outbreaks have been eradicated.

The two outbreaks were reported separately in the summer of 1951 and swift action was taken by the Department to define and quarantine the affected areas. Measures to eradicate the pest were put into operation immediately.

The outbreaks were the largest ever to occur in this State and as they were in commercial fruit growing districts close to main producing areas the difficulties of eradication were increased. Approximately 140 acres of orchards in the Mullalyup district and 70 acres in the Nannup district were affected.

The Government, at the time and since, provided adequate financial assistance for the purchase of modern power spraying machines, tractors and materials and staff to cope with the outbreaks. In addition, funds were provided in the initial stages to compensate growers who could not market their fruit on account of quarantine restrictions and later for compensation for losses incurred by spray burn and spray residues.

The active steps taken to eradicate the pest during 1951 brought encouraging results during the following growing season. Although a small number of Codling Moth larvae were found in restricted areas in both districts, no signs of infestation could be found on many orchards that were previously grossly infested.

The treatments were continued during 1952 and subsequent years, but despite many close surveys, no further traces of the pest could be found.



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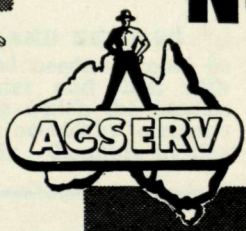
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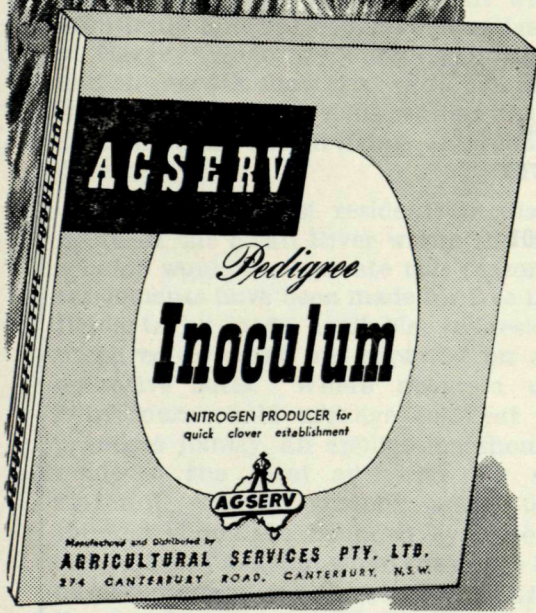


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