DEPARTMENT OF AGRICULTURE OF WESTERN AUSTRALIA

BULLETIN No. 2632

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PASTURE MANAGEMENT AND THE EURO PROBLEM IN THE NORTH-WEST

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Reprinted from
"The Journal of Agriculture of Western Australia"
Vol. 8 (Third Series) No. 3, May-June, 1959

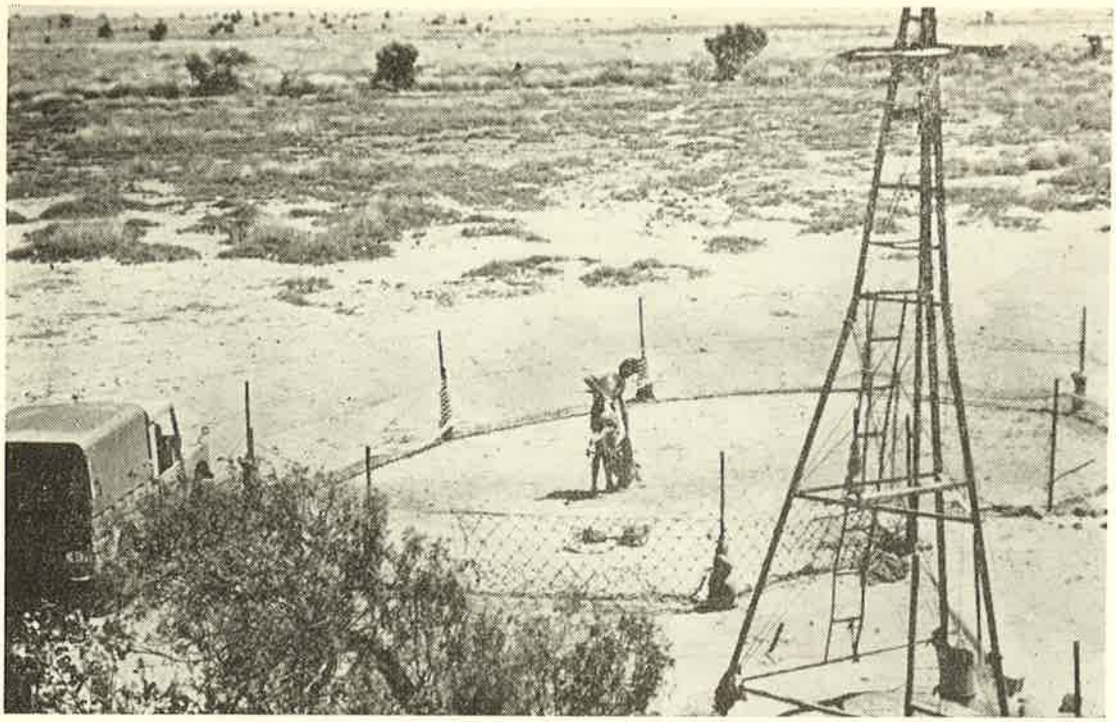

Fig. 1.—Part of the trapping yard. A euro is being put into a bag for examination

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By E. H. M. EALEY, M.Sc., Wildlife Section C.S.I.R.O., and H. SUIJDENDORP, B.Sc. (Agric.), District Adviser, North-West Branch.

OVER the past 20 years sheep numbers in the North-West of Western Australia have suffered a marked decline. In the Pilbara area, six stations have been abandoned, and about a dozen more are in a precarious position. If these were to be abandoned also, some 10,000,000 acres of sheep country would be idle. It is now known that the shrinking flocks have been caused by a deterioration in the pasture vegetation, particularly the disappearance of the more nutritious native grasses on which breeding ewes depended to provide the high-protein diet required for the production and rearing of their lambs.

Poor seasons have often been cited as a contributing cause of the decline in stock numbers. In this connection it is interesting to note that in the Pilbara district a big decline took place between 1934 and 1946, and this coincided with the highest average rainfall period on record (see Table 1). Certainly the extremely low summer falls in the last ten years have made regeneration of the vegetation difficult and slow, even though stock numbers were at a very low level.

TABLE 1

AN ANALYSIS OF THE RAINFALL RECORDS FROM WOODSTOCK, 1908-1957

	1908-17	1918-27	1928-37	1938-47	1948-57
Mean Summer	1,015	976	985	1,212	710
Mean Winter	347	176	248	206	278
Mean Annual	1,362	1,152	1,233	1,418	988

In the opinion of the local pastoralists, the main factor in the deterioration of the north-western country has been the grazing of euros which had built up to very

Fig. 2.—The watchtower from which continuous watches of up to a fortnight were kept to determine the drinking patterns of marked animals

high numbers as a result of the increased provision of stock waters. This was why the C.S.I.R.O. started its investigations in the Abydos-Woodstock area, with the object of assessing the importance of the euro as a competitor of the sheep and of indicating the best method of bringing them under control if this was found to be essential or desirable.

OVERSTOCKING TO BLAME

The evidence now available points to the fact that the prime cause of the deterioration of the North-West pastures has been a stocking policy that is unsuited to the climate and conditions, and not to the grazing of euros that have bred up following increased water supply. In areas where there has been abundant natural water for hundreds of years, pastures have degenerated under stocking in the same manner as where water has recently been provided. Moreover, experiments carried out in enclosures with kangaroo-proof fences have shown that stocking by sheep alone can quickly produce the pasture changes that have occurred in the region as a whole.

Evidence from the vermin-proofed grazing trials at Abydos indicates that continuous selective grazing at the rate of one sheep to four acres will prevent all regeneration of pastures. On stony country such as Abydos, the better patches must have

Fig. 3.—A research worker, silhouetted against the evening sky, identifies individual euros by the symbols on their collars. These are in reflector tape which gleams in the spotlight attached to the binoculars

Fig. 4.—A close-up of a euro, showing the collar and symbols which identify it. The collars are of yellow plastic and the symbols are in red "scotchlite"

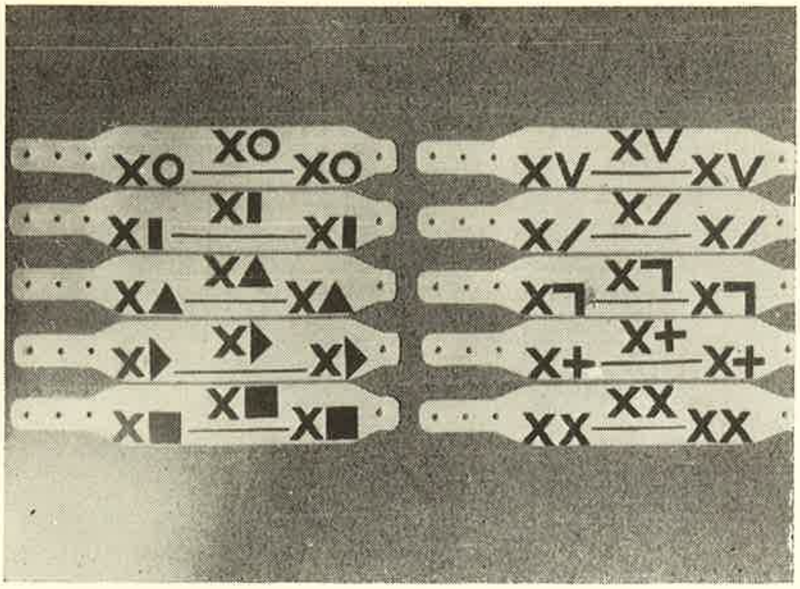


Fig. 5.—Plastic collars used for identifying euros. The animal which wore the collar marked "XX" has been seen 17 times in an area of less than a quarter-mile square

carried at least that number to average an overall stocking rate of one sheep to 18 acres. On first-year burns, it was found that one sheep to ten acres consumed all that was produced in the way of palatable forage in the first wet season leaving nothing to produce seed or carry on until the following year.

The time of burning of spinifex (*Triodia pungens*) determines the type of plant community that will emerge after the first rains. Burning at mustering time (April-May) combined with uncontrolled grazing encourages a speedy return of a pure stand of spinifex. Such a pasture will not be sufficiently nutritious to allow ewes to lactate.

Although it is clear that first attention should be paid to stock policy and stock management, an over-abundance of euros can certainly be expected to aggravate pasture degeneration caused by sheep and slow up the process of regeneration, and therefore action to reduce euro numbers will often be necessary. As water poisoning remains the most promising method of control, special attention was paid in the C.S.I.R.O. investigations to the drinking habits of the euro.

WATERING HABITS

As is well known, euros start coming in to water—either to natural waters or drinking troughs—when conditions are dry and beginning to get hot, usually some time in September or October; and as the summer advances they will come in to water in increasing numbers. Thunderstorms and cyclones may produce rain as early as November, which may continue intermittently until March. In exceptional years, rain may occur through the winter until August.

On Woodstock the creek beds provide the main natural watering places. Heavy rain causes the creeks to run for a few days, after which the water that has not flowed down to the sea sinks through the sand. Almost all the surface water in the creek beds has dried up by early summer, and the euros then have to dig down through the sand for two or three feet to obtain a drink. By mid-summer most of the water that can be reached in this way has dried up.

The general seasonal pattern of drinking was determined by attaching automatic counting devices to water points which provided a record of how many animals drank each night at different times of the year. The details of the euro's drinking habits were mainly worked out from observations made at one particular artificial watering place. This study involved the catching and marking of some hundreds of euros, which were provided with plastic collars bearing reflecting symbols. These enabled the animals to be individu-

Fig. 6.—A large buck euro can exceed 90 lb. in weight and is difficult to handle

ally recognised, by day or night, by observers stationed on a watchtower at the water point. These observers were equipped with a spotlight and high-power binoculars. The records that disclose the actual frequency of drinking were made during a period of continuous day-and-night watching carried out over a period of 17 days. It was important to know whether the marked animals under observation were getting drinks at other water-points nearby, so these were fitted with automatic dye-squirting devices that would mark the fur of any animal coming to drink at them.

The results of this investigation show that euros usually drink at the same place, although disturbance could cause some to move to water three or four miles away. More important, it was revealed that most euros did not drink very often, even when conditions were dry and temperatures were high. (By December, if rain has not fallen, most euros would be drinking fairly frequently although not every day.)

When it was realised that, even at the height of the North-West summer, euros did not come in to drink daily, with water conveniently available, the ability of the animals to cope with desiccation and water-shortage was looked into further. A group of euros was confined on a patch of typical spinifex country, with one small rock outcrop and no available water. Some of them survived the months of September, October and November without drinking.

In the physiology of the euro, water has two main uses, regulating the body temperature (which means cooling the body in summer) and the production of urine, in which the body's nitrogenous wastes are removed in solution. Observations indicate that euros are able to economise on water usage by (a) not moving during the heat of the day, (b) seeking shade in caves where temperatures may not exceed 90° F. despite outside air temperatures of 115° F., and (c) by reducing their food intake so that less waste products are produced in

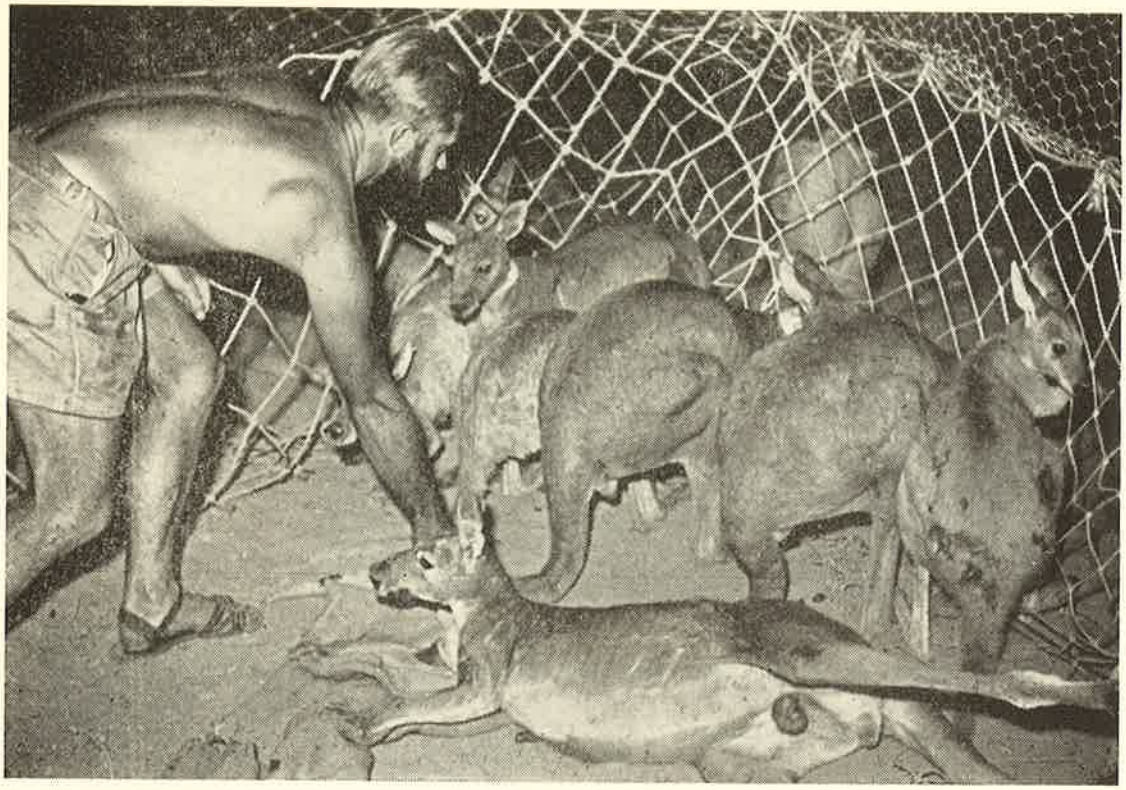


Fig. 7.—Euros, dazzled by strong lights, are easy to catch at night time

Fig. 8.—Young female euro licking her fore-paws to cool herself

Fig. 9.—A euro leaving a "soak" where water could be obtained 2 ft. below the surface of the sand

the body needing to be washed away as urine. It is possible also that the species has developed as yet undetermined physiological adaptations to help it survive dehydration for long periods.

WATER POISONING IN PRACTICE

The results obtained in the experiments and observations just described emphasise two very important practical points. The first is that to get a worth-while percentage of the euros watering at any point, poisoning operations must be continued over several days. A minimum of six days is recommended. The second is that poisoning should only be attempted under hot, dry conditions, for it is only then that the whole local euro population will be watering with any frequency. Generally speaking, in the North-West, it is usually not worth while poisoning until December. November poisoning should not be attempted unless the month happens to be very hot and dry and has been preceded by an extended dry spell.

Although a single watering-point can be poisoned with good effect, to get the best and most lasting results it is recommended that all watering points on a substantial area—say 50,000 to 100,000 acres—should be poisoned in one drive.

The normal stock-drinking troughs should be used, and care should be taken not to leave strange objects about the water-points, as euros are liable to be frightened away by them, and might not return to drink for a week or more. The carcasses of poisoned animals should be removed from the neighbourhood of the water-points, especially from the pads and tracks leading into them. The concentrations of arsenical poisons given below make almost tasteless solutions, and will kill most animals some distance away from the troughs. If stronger solutions are used, animals will die closer in; and they may drink less because of the increased repellency—some animals may even be repelled at the first taste and refrain from drinking any more.

If the paddock in which poisoning is carried out is stocked, sheep can be excluded from the trough by a six-strand strained wire fence, which should preferably be a permanent fixture 25 yds. square, with gates to allow easy access of stock at other times. Wires should be checked for slackness each night when the gates are closed and the trough filled with the poisoned water.

The kill at a water point can be calculated on the basis that the average euro will drink $2\frac{2}{3}$ pints and the average plains kangaroo $3\frac{1}{2}$ pints. (Individual plains kangaroos may drink as much as 12 pints at a visit.)

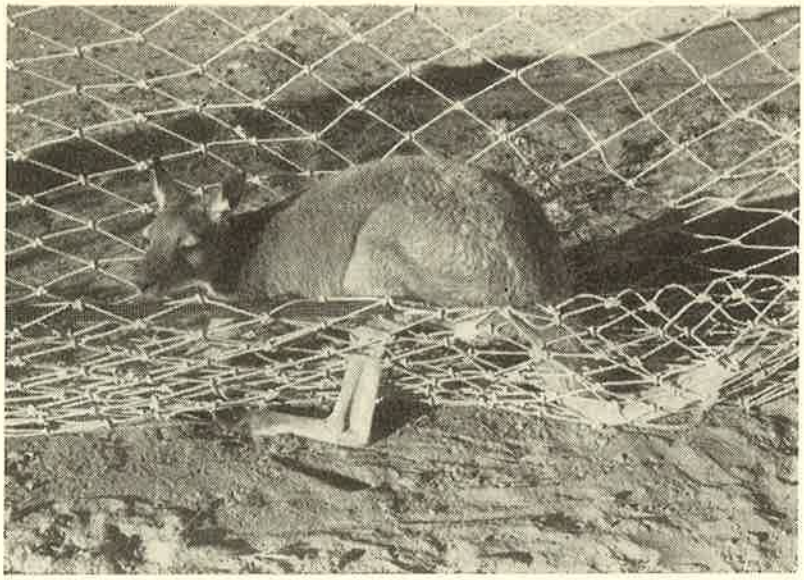


Fig. 10.—A buck euro tangled in the netting of the trap

It is unnecessary to look beyond arsenicals for water poisoning, as they are readily available and known to be effective. The following are recommended at the concentrations given. The "tin" mentioned is a round, 2-oz. fine-cut tobacco tin which is a standard practical measure used on stations. It holds about 6 oz. by weight of sodium arsenite.

(a) **Sodium Arsenite**—1½ tins or 8 oz. to 40 gallons of water. A solution of sodium arsenite can be purchased as a weedkiller under the name of Arzeen Liquid. If this is used—2 tins or 8 fluid oz. to 40 gallons of water is a sufficient dose but this solution can be tasted.

Soluble sodium arsenite can be prepared from the comparatively cheap but insoluble white arsenic (arsenic trioxide) and soda. 3 lb. washing soda plus 2 lb. white arsenic will produce enough soluble arsenic for 320 gallons of water. Alternatively 1 lb. caustic soda plus 2½ lb. white arsenic produces enough soluble arsenic for 400 gallons of water. In making up the solutions the quantities given above *should be strictly adhered to.* The arsenic and soda should be boiled in about 4 gallons of water until dissolved and the solution kept in airtight containers, preferably of glass or plastic, until broken down for use. If it is stored in 26 oz. bottles, 4 gallons will fill 24 bottles. Three bottles to 40 gallons of water will be required if washing soda is used and three bottles to 50 gallons if caustic soda is used.

(b) **Arsenic Pentoxide**—2 tins to 40 gallons of water. Unless care is taken that all the powder goes into solution the poison will not be strong enough. (This can be purchased in proprietary form of "Feltons Kangaroo Poison.")

Water Softening.—Where the water is known or suspected to be hard, a water softener such as "Calgon" (Sodium Hexametaphosphate) must be used or the arsenic will come out of solution. It is never necessary to use more than 1 lb. "Calgon" to 350 gallons of water. This should be mixed into the water before adding the arsenic solution.

REINFESTATION OF A POISONED AREA

An area that has been effectively poisoned will be subject to reinfestation by euros either by immigration or as a result of the breeding-up of survivors.

It has always been suspected that, unlike the nomadic plains kangaroo, the euro

Fig. 11.—Technical assistant B. Harbers takes an instrument into a cave where euros sleep during the day. The cave is in a granite outcrop and temperatures below 90° F. were recorded there when outside temperatures exceeded 115° F.

is sedentary in its habits. Observations made during the course of the Woodstock investigations have confirmed this. Marked individuals have shown a strong tendency to remain within the same area, which may have a radius of less than one mile. The attraction which an established home range has to a euro has been demonstrated by the fact that marked animals removed from their normal beat will return to it, even from a distance of as much as ten miles. It seems safe to conclude, therefore, that reinfestation by immigration is unlikely to prove an important factor under normal conditions; and this is borne out by practical experience. Areas that have been effectively poisoned have not become rapidly reinfested, even though dense euro populations occurred within six miles.

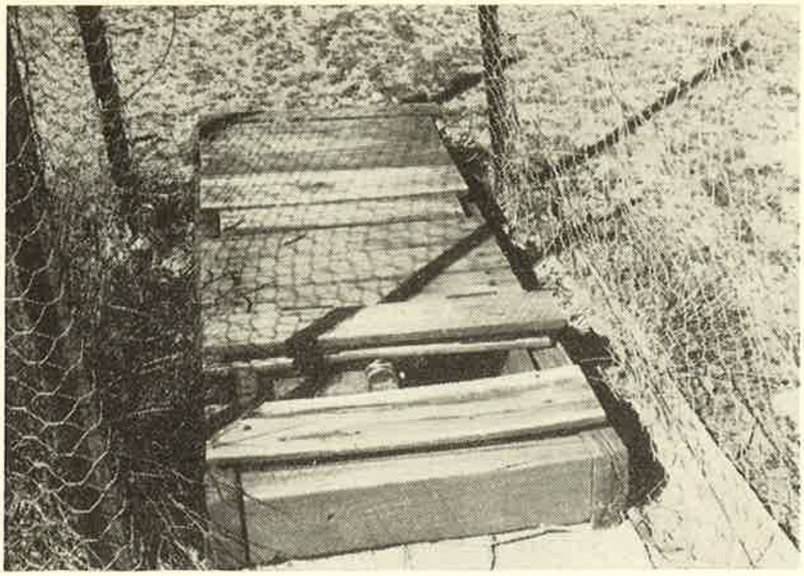
The Woodstock investigations included observations on euro reproduction, and their results give some indication of the rate at which the population surviving in a poisoned area would build up as a result of breeding. Because of the length of the combined gestation period and the pouch life of the joey, an adult doe euro can normally only produce and rear one young one a year; and because a natural population will comprise rather less than one-half males and will also include old does whose fecundity is falling off and non-breeding juveniles (less than two years old) the maximum possible rate of increase will probably be nearer 30 than 40 per cent. per annum. Such a rate of increase could, of course, rapidly nullify the effects of, at any rate, an inefficient poisoning. However, we know that in nature this theoretical maximum will rarely be attained, and even more rarely maintained over a run of years. Observations have shown that quite a high mortality must be expected in the pouch young, and that a high survival rate is only likely to occur in a season when the summer rains began early and were not followed by a dry winter.

When a really effective poisoning is carried out, reducing the euro population in the treated area by 80 per cent., the original numbers could be built up by breeding in six years—if they were all favourable. Such a continuous run of good seasons would be most unusual; and in practice a euro population would almost certainly need at least a decade to recover, by breeding, from the effect of a really efficient poisoning campaign. Where uncontrollable natural waters occur to reduce the efficiency of operations, more frequent poisonings will of course be required.

COMBINED PASTURE MANAGEMENT AND EURO CONTROL

The success of a deferred grazing technique in bringing about pasture regeneration has been demonstrated both in experimental plots and large-scale trials in

Fig. 12.—Automatic counter to record the number of euros which drank at a water-point. The treadle has had a board removed to show the counter



the North-West. Good results have been obtained even under conditions of heavy euro infestation, although no doubt they would have been even better with euros under control.

Muccan Station carries about 14,000 sheep and a population of kangaroos estimated to be considerably larger. The management programme of a flock of 3,000 wethers was changed in 1954, off-shears, from continuous grazing to a deferred rotation. Whereas before these sheep were scattered over five paddocks, the entire flock is now moved from paddock to paddock at roughly three-monthly intervals, care being taken that a different paddock is stocked during each wet season. Since deferred grazing has been practised, flock numbers have been increased to 5,000 in those paddocks.

The cut of wool per head in this wether flock can be taken as a measure of the improvement in the vegetation under the changed system of grazing. It rose from 7.33 lb. in 1954 to 8.16 lb. in 1958.

That this increase was not due to improved seasonal conditions is shown by comparison with the wool yield of a flock of ewes. These ewes were occupying "river" paddocks which, of necessity, have been deferred every year because of the risk of flooding. It is not possible to improve these pastures further so fluctuations in cut of wool per head of the ewes in them are a reflection of seasonal conditions. The poor seasons occurring over the last few years actually caused the cut of wool per head to fall from 7.34 lb. in 1954 to 6.89 lb. in 1958. The improvement in productivity of the wether paddocks occurred despite relatively poor seasons and despite severe competition from kangaroos, the effective control of which was rendered difficult by the occurrence of natural water.

In most cases rotational grazing may not be warranted; but deferred grazing is essential if the North-West country is to be brought back to anything like its former productivity. The principles involved are straightforward and simple, and can be summarised as follows:—

(1) Burn the mature stand of spinifex before summer rains are expected. Burn as much of the paddock as is practicable.

(2) Keep stock out of the paddock during the wet season until seedlings have become established, have matured and have themselves produced seed.

(3) After the seed drop, stock the paddock fairly heavily to ensure the seed is trampled in before it is blown away or consumed by birds or ants.

(4) If possible, apply deferred grazing in the same paddock for two wet seasons in succession. This will ensure good seedling establishment from recently-produced seed.

Fig. 13.—Preparing blocks of salt and "1080" poison. Euros did not take salt freely enough to make poisoning by this method effective

As euros cannot be efficiently poisoned unless conditions are ideal for the job, and as pastures can be rehabilitated despite them, attention should be directed first and foremost to pasture management and euros ignored until the occurrence of ideal conditions for poisoning. Deferred grazing, which involves the planned movement of stock, could be made to gear in with a euro control programme. Poisoning in stocked paddocks calls for much more work and attention than poisoning in unstocked country; and the extra trouble involved might discourage many station owners from adopting the method recommended to give the best overall results, i.e., poisoning groups of watering points in one simultaneous drive, and poisoning each one over a period of about a week. If carefully planned, a deferred grazing programme could be arranged so as to leave a substantial section of the property unstocked during the dry season, and euro poisoning operations can be concentrated in this area. Although in general conservative and rather sedentary animals, it is known that euros tend to move from heavily-stocked paddocks into near-by unstocked ones; and this tendency will help to increase the effectiveness of the control measures.

It is unfortunate, but unavoidable, that many birds will be destroyed during a prolonged poisoning campaign. However, seed-eating birds must be regarded as a nuisance in country under deferred grazing, the whole object of which is to encourage and exploit to the full the seed crop of the more nutritious grasses.

The policy recommended here will not exterminate euros from the North-western pastoral country, but it should keep them at a level at which their effect on pasture regeneration is negligible. Stations with natural waters can still be expected to show improvement, although of course competition between sheep and euros will be greater in such country.

ACKNOWLEDGMENTS

The help and encouragement of Messrs. R. Lukis, A. Hardie, D. Shilling, J. Knight, J. Greene and other pastoralists in the district are gratefully acknowledged. Most of the experimental work was carried out on the Abydos-Woodstock Pastoral Research Station, where facilities provided by the Department of Agriculture were maintained by Mr. R. G. Sherlock, the station manager whose co-operation and assistance were appreciated.

Water-consumption data on the plains kangaroo was provided by Mr. D. Gooding of the Vermin Branch. The Assistant Government Chemist, Mr. Gorman, gave useful information on arsenical poisons.

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