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PROBLEM ANIMALS IN THE
PROVINCE OF THE CAPE OF GOOD
HOPE, REPUBLIC OF SOUTH
AFRICA

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The Republic of South Africa, situated at the southern extremity of the African continent is 472,500 square miles in extent. It is subdivided into four Provinces (Cape, Orange Free State, Transvaal and Natal) each of which is responsible for the conservation of Fauna and Flora. This function has been delegated to their respective Departments of Nature Conservation.

The Province of the Cape of Good Hope or Cape Province covers an area of 277,000 square miles, which is approximately 60% of the total area of the Republic. It is bounded by a rugged coastline of 1,600 square miles, washed by the cold Atlantic Ocean on the West and the warmer Indian Ocean on the East. Lying between latitudes 20° 40' and 34° 50' south, it is well within the temperate zone.

Physically, the Cape Province can be divided into a series of plains shelving up towards the interior in broadening steps. The coastal belt, which rises from sea level to an altitude of 2,000 feet, circumscribes the higher interior territory by a chain of mountains running roughly parallel to the coast. Although the coastal belt is well defined from the viewpoint of altitude, rainfall and general climatic conditions vary considerably. The region between the Orange and Olifants Rivers is arid (rainfall 4 - 7 cm. per annum) and the vegetation consists of desert succulents and desert grass. The Western Province and South-western districts, extending from the Olifants River to beyond the Gamtoos River, enjoy an adequate winter rainfall and the vegetation consists of sclerophyllous shrub. The eastern division of this coastal area has a summer rainfall and is covered by evergreen and deciduous bush, sub-tropical forest and tall grass.

The Little Karroo is divided from the coastal belt by the Witteberg and Swartberg ranges in the North-west and the Langeberg and Outeniqua mountain ranges in the South. The climate is varied and the region forms a transition between the more humid coastal belt and the dry interior.

The Great Karroo is a vast stretch of fairly level country dotted with flat topped hills, at an altitude of 2,000 to 3,000 feet, situated between the Little Karroo and the great escarpment. The highest and most extensive of the Cape plateaux extends northwards from the great Karroo to the Orange River at an elevation of 3,000 to 6,000 feet. This area is dry, especially in the west, and temperatures range from severe frost to 110°F in the shade. The mountainous Eastern Province consists of rolling hills and grass covered mountain ranges of which the Drakensberg is the most important.

South Africa is a relatively dry country. Little more than 10 per cent receives a mean annual rainfall of more than 30 inches and two-thirds less than 20 inches. Furthermore, over 85 per cent of the country the rainfall occurs mainly in summer when day temperatures are high and evaporation and

transpiration are rapid. Much of this rain falls in the form of thunderstorms. Consequently, it is estimated that barely 6 per cent of the rainfall returns as riverborne run-off into the sea and most of the natural vegetation is characteristically well adapted to conserve moisture and survive droughts. Winter is normally a dry season everywhere except in the south and southeast where, from March to October, the passage of cyclones from the South Atlantic brings rainy weather in the lowlands and snow on the higher mountain peaks.

The temperatures are influenced more by altitude than by latitude. Despite the relatively low latitude, 22 - 35°s, frost is usual in winter on the interior plateau. There, even in summer, although day temperatures are high the nights are cool and clear because of the elevation and the generally low humidity. At Bloemfontein, at 4,670 feet, the mean daily temperature range is thus between 60° and 85°F during the hottest month. The corresponding temperatures in mid-winter are 32° and 62°F., and frost occurs on 37 nights in an average year. Near the coast, nights are generally warmer and winters milder. At Durban the mean daily temperature range is between 69° and 82°F. in February, 52° and 72°F. In July, frost is unknown, and subtropical crops such as bananas and sugar cane are grown. Even near the southern extremity of the continent the mean daily minimum in mid-winter at Cape Town is 47°F

Farming is one of the most important occupations in South Africa and includes a wide variety of activities including animal husbandry, (cattle, sheep, poultry, horses, goats and pigs) and agronomy (maize, wheat, vegetables, groundnuts, fruit and vines). Much of the farming is mixed and monoculture is limited chiefly to the maize belt. All these farming activities are affected to a greater or lesser degree by wildlife, and the animals concerned are what may be termed "problem animals". They include such widely divergent species as the Black-backed jackal (Canis mesomelas), public enemy No.1 of the sheep farmer and certain species of omnivorous birds which cause only limited and seasonal damage in orchards and vineyards.

Sheep farming has always been an important activity in South Africa and today it is estimated that over R2,500 million is invested in the sheep and wool industry, which supports over 750,000 persons of a total population of 15 million. The total sheep population of the Republic is approximately 40 million of which 33 million are wool producing. Losses as a result of predation are estimated to be between 400 thousand and half a million sheep per annum. This would represent about R5 million per annum (1R = \$1.35).

The policy of the Cape Provincial Department of Nature Conservation is based on the concept of "wise management" of wildlife resources. Where crop damage is real, control measures are essential. These, however, must be adapted to the species concerned and applied only where the damage is taking place. Blanket measures which also kill many useful species must be avoided. For this reason, the control of problem animals should be vested in the agency concerned with wildlife conservation.

The wide variety of topography and climatic factors in South Africa has influenced the character of the natural vegetation. This, in turn, has a marked effect upon the fauna. When the first Europeans settled at the Cape in 1652 the country teemed with mammals in great variety. These included

the so-called big game animals such as the elephants, hippopotamus and rhinoceros, antelope in greater variety and numbers than any other country in the world, numerous species of rodents and a rich population of carnivores. It is with the latter groups that we will be chiefly concerned in this paper.

The early colonists suffered heavy losses of stock from the depredations of predators and it is recorded that in June, 1656, rewards were offered for the destruction of lions, "wolves", hyaenas and leopards. The reward paid in respect of a lion was the highest consisting of "six reals of eight". This was the origin of the bounty system which persisted until recent times and is now generally regarded as being ineffective and is being replaced by a system of Technical Aid.

Today, the Cape Province is largely subdivided into farms and consequently the farm has become the habitat of surviving forms of wildlife. Wildlife conservation can, therefore, only be effective with the support and good will of the farming community. The South African farmer, the descendant of pioneering stock, is a rugged individualist and the master on his own property. Conservation measures cannot be enforced, they can only be introduced on a basis of cooperation and mutual understanding.

While the majority of farmers are prepared to accept wild animals as residents on their farms, they will not tolerate undue crop damage or losses of livestock. Such losses are caused by a variety of animals which will be discussed in this paper.

The order Carnivora is well represented in South Africa by the Viverridae (civets, genets and mongooses), the Mustelidae (badgers, otters and polecats), the Felidae, Canidae, Hyaenidae, and that peculiar animal, the Aardwolf, Proteles cristatus. To these must be added feral domestic animals, particularly vagrant dogs which are becoming a very real problem especially in the vicinity of towns. Although packs of underfed mongrels are the major pest, predation is by no means confined to these animals. There are occasions when pedigree dogs band together and kill for the sheer lust of hunting. The result is that farming with small stock on farms bounding on a municipal area has now become virtually impossible.

Control Techniques

The oldest control techniques are hound traps, shooting, poisoning and denning. In South Africa, hounds have always been a popular method of hunting jackal and lynx and have proved reasonably effective. Today there are still 110 registered hunt clubs in the Cape Province receiving subsidies from the Department of Nature Conservation. These clubs maintain packs of hounds and employ full time hunters.

It has long been felt that the techniques mentioned above were limited in their effectiveness and consequently inadequate. The best pack of hounds seldom takes more than 200 jackals in a year and, furthermore, the use of hounds is limited by season, climatic conditions and terrain. Traps are only as effective as the persons handling them and really good trappers are few and far between. In the hands of inexperienced hunters traps kill numerous useful and harmless creatures. Furthermore, traps cause undue suffering

especially in instances where trap lines are not inspected daily. Hunters have been limited in their choice of poisons and have relied chiefly on strychnine, which has decided disadvantages as is well known to delegates attending this congress. We have found that the most effective method of disguising the taste of strychnine is to apply it to the gut and intestines of freshly killed ungulates, stirring it into the partly digested food and dung. Prior to World War II, farmers were able to obtain glass capsules of prussic acid which could be placed in animals recently killed, or even attached to the wool in the neck region of live sheep. It was considered highly effective, but owing to the risks involved in both manufacture and use, supplies are no longer available. Denning is an old method of control but the location of dens may almost be regarded as an art. Today it is becoming a lost art, for there are few who still possess the skill and experience of the hunters of the past generation. Furthermore, as denning only disposes of young animals it is more a control measure than an extermination measure.

Until 1957, the bounty system was in operation in the Cape Province, in combination with the control techniques listed above. Under this system a divisional council could apply to the Provincial authorities for any wild animal to be declared vermin and place a bounty on its head. The Provincial Administration was then required to contribute an equal amount. The highest bounty was paid on the Leopard (R10 = \$13), and even animals such as the mongoose and crow were included on the list. Very often, farmers' associations or even individual farmers paid an additional special bounty on animals killed in their area.

Records are available of the numbers and kinds of animals on which bounties were paid by the Provincial Administration and the following data have been extracted from the last schedule published, covering the period 1st January to 31st December, 1956.

TABLE I

LIST OF ANIMALS ON WHICH BOUNTIES WERE PAID IN 1956.

Leopard (<i>Panthera pardus</i>).....	90
Black-Backed or Red Jackal (<i>Canis mesomelas</i>).....	20,084
Cape Silver Fox (<i>Vulpes chama</i>).....	15,323
Aardwolf (<i>Proteles cristatus</i>).....	121
Lynx (<i>Felis caracal</i>).....	3,408
African Wild Cat (<i>Felix libyca</i>).....	8,478
Otter (<i>Aonyx capensis</i>).....	99
Badger (<i>Mellivora capensis</i>).....	40
Baboon (<i>Papio ursinus</i>).....	7,012
Mongoose (<i>Viverridae</i>) and Genet (<i>Genetta tigrina</i>)...	814
Porcupine (<i>Hystrix africae-australis</i>).....	359
Cape Dassie (<i>Procavia capensis</i>).....	319,322
Eagles.....	153
Crows.....	5,640

Apart from the number of animals on which bounties were paid, it is interesting to note the inclusion of species which are generally regarded as useful or which cause only limited losses of stock. During 1956, 15,000 Cape

Silver Fox (Vulpes chama) were killed. This total probably included the Bat-eared fox (Otocyon megalotis). The latter animal is certainly harmless, although the former may take to killing occasional lambs. These are usually individual rogues which can be dealt with, and there is no reason for including this animal on the bounty list.

In 1951, the Provincial Administration of the Cape agreed to the abolition of the bounty system and its gradual replacement by a system of what might be termed Technical Aid, This new system envisaged the payment of improved subsidies to Hunt Clubs, the training of hunters and assisting them in the field, the provision of first class hounds and other appliances for predator control. The payment of bounties on all animals, except the Black-backed jackal (Canis mesomelas) and the lynx (Felis caracal) was immediately suspended. As soon as the new system was brought into operation these bounties were also to be discontinued.

Here it must be stressed that in contrast with the system in operation in the United States of America, the Department of Nature Conservation which is responsible for predator control, does not undertake the hunting of predators or problem animals. Actual hunting is done by the hunters of the clubs controlled by divisional councils. Hunting undertaken by the staff of the Department is incidental to the training of hounds, the testing of techniques, research and the inspection of hunt clubs.

In order to ensure the efficient functioning of hunt clubs, the Provincial Administrations of the Transvaal and the Cape have established Hound Breeding and Research Stations at Panfontein in the Transvaal and Vrolijkheid in the Cape Province. At these stations hounds of the highest quality are bred, trained and constituted into packs. A pack usually consists of eleven fox-hounds, a greyhound and two fox terriers. The greyhound is kept at heel until the jackal breaks cover and the fox terriers are carried in special saddlebags in the event of the jackal going to earth.

A unique system of predator control is in operation in the Orange Free State, where the terrain is especially suited for hunting jackal and lynx with hounds. Here, with the assistance of the Provincial Administration, what might almost be termed a super hunt club has been established. This organization employs a number of professional hunters and has numerous packs of hounds, horses and transport. Farmers can call on this organization and are required to pay for the services rendered.

Training courses are arranged for hunters by the Department of Nature Conservation, to instruct them in the care and use of hounds and other methods of predator control. Periodical visits are made to hound clubs by the Nature Conservation Officers to ensure that clubs are functioning efficiently. These training courses and inspections are essential, as the effectiveness of a pack of jackal hounds depends to a large degree upon the skill of the hunter. Even the finest pack of hounds is wasted in the hands of a poor hunter.

Nevertheless, despite a decided improvement in efficiency, these measures in themselves were felt to be inadequate, and in 1959, I was accorded the privilege of visiting the United States to study American methods of predator control and other problems of wildlife management by a study grant from the

United States - South Africa Leader Exchange Program. I cannot speak too highly of the manner in which I was received in the United States. From the Directors of the Federal and State Departments to the field officers, I was given every assistance in my studies.

From my observations, it appeared that two American techniques could be employed to advantage in South Africa viz. the Coyote Getter and the poison 1080, used preferably in combination. Introduction of these methods was recommended, inter alia, in the report submitted to the Cape Provincial Administration on my return to South Africa (Hey, 1960). In this report it was suggested that it would be advisable to acquire the services of an American expert to test these techniques in South Africa. In collaboration with the United States - South-Africa Leader Exchange Program, the Cape Provincial Administration arranged with the U. S. Fish and Wildlife Service for a visit by District Agent, Mr. Malcolm Allison. Mr. Allison duly tested the techniques in the Alexandria, Fort Beaufort and Robertson divisions of the Cape and training two field officers in their use (Allison, 1961).

Subsequently, we have persisted with the use of 1080 and getters for the control of the black-backed jackal and are satisfied that in the hands of competent hunters, they are highly efficient.

Numerous scented baits recommended by Mr. Allison have been tested and modified to suit local conditions. Of these, the following have proved the most effective:-Ground beef, fat and cheese plus beaver castor and neutro-leum; Horseflesh, donkey blood, brain and beaver castor; fish, brain, blood, donkey fat and beaver castor.

Strangely enough, we have not been able to compound an attractive bait from the flesh of wildlife. The only two ingredients which we have found to produce any results are porcupine and guinea fowl.

As is to be expected in the development of any new project, we have struck a number of snags in the use of the coyote getter. Some of these we will overcome in time and I hope to obtain assistance in solving other difficulties during my present visit.

These include:-

1. When using getters in the rainy season the bait is inclined to be washed off the head unless it has a day of fine weather to set. This has been overcome by preparing and drying heads prior to setting.
2. In some localities insects are attracted to the head and consume both the bait and sheep's wool leaving the bare metal. The addition of a small quantity of 1080 to the bait seems to provide the solution.
3. The percentage of recoveries, even from good pulls is disappointing and in some cases this was thought to be due to the charge being too light. We now incline to the view that shells deteriorate rapidly and also that they cannot withstand summer heat. For example, during tests in the Kimberley area in January 1964, only 22 jackals and two dogs were recovered from 90 perfect pulls. The distance from the getter varied from 5 to 780 yards.

A careful examination of shells indicates that the seals melt when exposed to our hot dry summer conditions (up to 110°F. shade temperature) and such shells cannot be reused. It has been found that the shells deteriorate even in the field kit boxes. More disturbing, however, is the deterioration of supplies at headquarters in a cool, **dry store**. A whitish-powdery discharge appears at the seal, which even contaminates the shell case.

It has been proved beyond doubt that the getter is more efficient in winter than summer. This applies to recoveries and not pulls. I cannot believe that our summer temperatures are higher than those likely to be recorded in Arizona or Texas, and I hope that this problem can be solved. It has been our experience that a jackal will not pull a getter a second time and we have no intention of developing a race of jackals educated to the getter. As it is, hunter's claim that jackals can almost read and write;

Contrary to experience in the United States with the coyote, jackals have been taken during the mating season, in pregnancy, and while feeding young.

We are fortunate that to-date no human casualties or losses of farm stock have been experienced as a result of the use of the coyote getter. Great pains are taken to ensure that every farm on which getters are used, is posted and the farm laborers warned. Apart from the black-backed jackal, animals which have taken the getter include -

Cape silver fox, aardwolf, bat-eared fox, civet cats, Mongooses and polecats as can be seen from Table 2, in which the results with the getter have been tabulated. These figures reflect the results obtained by field officers of the Department of Nature Conservation. Coyote getters have only recently been made available to hunters from hunt clubs who have completed courses at Vrolijkheid.

TABLE II RESULTS OBTAINED IN FIELD TESTS WITH THE COYOTE GETTER BY OFFICERS OF THE DEPARTMENT OF NATURE CONSERVATION IN THE CAPE PROVINCE DURING THE YEARS 1961, 1962 AND 1963.

District	No. Set	No. Pulled	Red Jackal	Silver fox	Dogs	Civet Cats	Grey Mongoose	Red Meercat	Polecat	Legevaan (Lizarc)	Ostrich	Total Kills
Alexandria	31	2	1	-	-	-	-	-	-	-	-	1
Fort Beaufort	391	50*	8*	1	5	2	1	-	-	1	1	19
Adelalde	127	19	11	-	-	-	-	-	-	2	-	12
Allce	25	2	1	-	-	-	-	-	-	-	-	1
Robertson	511	93	40	5	8	2	2	1	2	-	-	60
Dudtshoorn	131	17	2	-	1	-	1	-	-	-	-	4
Montagu	11	4	1	-	-	-	-	-	-	-	-	1
Bonnievale	47	6	5	-	-	-	-	-	-	-	-	5
Klaasvoogds	27	2	2	-	-	-	-	-	-	-	-	2
Swellendam	58	5	4	-	-	-	-	-	-	-	-	4
Caledon	20	1	-	1	-	-	-	-	-	-	-	1
Uitenhage	65	6	-	-	-	-	-	-	-	-	-	0
Worcester	19	1	1	-	-	-	-	-	-	-	-	1
Ceres	30	5	4	1	-	-	1	-	-	-	-	6
De Wet	6	3	1	-	-	-	1	-	-	-	-	1
Stanford	10	4	4	-	-	-	-	-	-	-	-	4
	1709	220	85	8	14	4	7	1	2	1	1	123

* It is suspected that some carcasses were picked up and used for bounty claims later, so the total of kills was actually higher.

Despite the problems listed above and the fact that some useful animals are killed, the coyote getter shows promise of being the most selective and efficient measure for dealing with the black-backed jackal.

In addition to the jackal, other major predators of farm stock in South Africa include:-

The Leopard (Panthera pardus)

This animal which was once common in all the mountainous areas of the Cape Province and extends northward to central Africa, is now becoming rare. It is a predator of large farm stock and can cause extensive damage. Various control methods are used, including tracking with dogs, shooting and traps. The fact that leopards have been eliminated from many areas and are becoming rare elsewhere is proof that they are not difficult to control.

The Lynx, or Caracal (Felis caracal) is a killer of small stock and poultry and a bloodthirsty hunter of small antelope and game birds. Where game is plentiful it may kill as many as five small antelope in a night, drinking the blood and feeding only on the soft parts.

Despite intensive agricultural development, the lynx is extending its range in the Cape and is now found in areas where it was unknown formerly. Many farmers claim that there is a relationship between the black-backed jackal and the lynx and that jackals control the lynx by feeding on the kittens. Be this as it may, there can be no doubt that the lynx is appearing in divisions where the jackal has been all but exterminated.

Hunters regard the lynx as being a stupid animal which is relatively easy to kill. Methods include the use of specially trained dogs which tree the lynx where it can be shot, or the use of traps. Unbaited traps are used as the lynx does not readily take bait. The development of a scent attractant would be of great assistance in control work.

Vagrant dogs. These can be effectively disposed of with poison or coyote getters.

In addition to the above-mentioned species, there are a number of animals which are regarded as minor predators of small stock and poultry. Prior to 1957, bounties were paid on a number of these animals. Today, we regard this as unnecessary but consider it the obligation of the Department to be in a position to advise landowners on the best control techniques. These animals will now be discussed.

The Cape Otter (Aonyx capensis) is a clawless, and appreciably larger than the common European form. It can cause extensive damage at a fish hatchery or among confined flocks of ducks and other poultry. The erection of otter-proof fencing or the use of traps are the recognized control measures,

The Ratel or Honey Badger (Mellivora capensis) resembles its European cousin being a short, thickset animal with a loose, heavy skin and short limbs, Incidentally, it is the toughest mammal in Africa, requiring a crushing blow on the head or a bullet through the heart to kill it. It hunts by scent, tracking its prey until it tires or goes to earth and then proceeds to dig it out. It causes losses of poultry and the usual control measures are hunting with dogs or trapping.

The genets or musk cats (Genetta sp.) are common and cause very extensive damage in the farm yard. They are usually trapped or shot. The mongooses, formerly called ichneumons (Viverridae) are a large family found throughout

South Africa. Where they are plentiful, they affect populations of game birds by robbing nests, and being carriers of rabies, they are a threat to public health. They are easily control led by means of traps or drop baits.

The African Wild Cat (Felis libyca) and the blackfooted cat (Felis nigripes) are two smaller members of the cat family. The former is common, but the blackfooted cat, so named because the soles of the fore and hind limbs are black, is a rare animal which lives in the open veld. In the natural state, they live on birds and small mammals, but on farms they frequently raid the poultry run. Trapping is the most effective control measure.

While undoubtedly the most important, the predators are by no means the only problem animals with which farmers in South Africa have to contend. There are a number of animals which compete with farm stock for grazing or by their habits impede control operations aimed at predators. These will now be discussed.

The Primates - Baboons (Papio ursinus) and monkeys (Cercopithecus aethiops). The Cape or Chacma baboon is common throughout the Province. It is an inhabitant of the krantzies and stony koppies, climbing trees in search of food in the form of fruit seeds, and tender shoots. They also feed on bulbs and roots, eggs, nestlings, and insects which they collect by turning over loose stones. Recently it has been claimed that they have taken to killing young sheep and lambs and are becoming carnivores. They associate in troops which may number from a dozen to over a hundred individuals.

The older methods of control consisted of organized shooting, trapping and poisoning, and were of limited efficacy as the animals are extremely wary. The latest technique consists of prebaiting an area with maize or fruit, and then treating this with Thallium. The baiting must be done in an enclosure of approximately twenty feet in diameter and five feet high, with the strands of wire spaced to exclude farm stock and small antelope. Although this method is highly effective, the application of the poison to the bait is hazardous and can only be entrusted to trained operators. For this reason, we consider that lethal doses of sodium cyanide in small gelatine capsules which could easily be inserted into fruit would be better and more humane. Sodium monofluoroacetate has not proved a suitable poison for primates.

A peculiar method, which is said to be employed with good effect in the dry regions of the Province, is to set out large basins of sweet wine in areas frequented by baboons. It is claimed that they become so intoxicated that they can be dispatched without difficulty.

Two monkeys are found in the Cape, the Samango (Cercopithecus mitis) and the Vervet Monkey (C. aethiops). Only the latter species constitutes a problem when present in large troops. They damage orchards and market gardens and are shot or trapped.

The Hyrax.

The hyrax, or as it is commonly called, the Oassie (Procavia capensis) is peculiar to Africa but also extends into Arabia and Palestine. The sight of these small, dark brown animals sunning themselves on a rocky outcrop is

characteristic of the African veld. They feed on a variety of green plants, consuming about 1½ pounds per day. Formerly, they lived in rocky situations on the tops of hills. Today they have moved down into the plains. When present in large numbers they have a very marked effect upon pastures as it is computed that 9 dassies are equivalent to 1 sheep. Control measures are shooting and hunting with fox terriers. It will be necessary to find a selective poison bait for large scale control. Research on this subject is proceeding at our Vrolijkheid Station (Hanse, 1963).

As indicated, Rodents are very well represented in South Africa and it is therefore to be expected that some species are included in the category of problem animals.

During the past year, the Cape Gerbille (Gerbillus) caused extensive damage in the wheat growing areas of the south western coastal belt. These fossorial rodents have always been endemic to this area, but a combination of favorable circumstances including a succession of dry winters followed by good summers, plentiful food and the destruction of their natural enemies caused the breeding population to build up to an extent which resulted in the excessive numbers of these rodents in the spring of 1963.

The problem was investigated by the South African State Departments of Agricultural Technical Services and Public Health in collaboration with the Provincial Department of Nature Conservation. Numerous control techniques were tested, including traps, poison baits and exploding petrol vapor in the runways. Of these, grain (oats) treated with 1080 was the most effective and in addition had the advantage that the animals died in their burrows, whereas animals killed with strychnine constitute a decided hazard to predators. Concurrent with the application of control measures, a campaign to promote the conservation of predatory birds and small carnivores will be launched.

Another fossorial rodent, the giant dune mole (Bathyergus suillus), contributes to soil erosion in the sandy coastal belt. These animals which can weigh up to 3 pounds, tunnel extensively, feeding on the roots of plants which constitute the ground cover. Research on the life history and habits of these creatures was commenced only recently and up to the present we have not succeeded in keeping them alive in captivity for any length of time. These animals are easily taken in traps, but for control on a large scale the use of poison gas or poison bait appears to be indicated.

Antelope. There are no less than 28 distinct species of antelope in South Africa and some of these compete with farm stock for grazing or damage cultivated lands and vineyards. In the case of smaller antelope, crop damage can be prevented by fencing, but even an 8 foot fence is inadequate to check Kudu. Controlled hunting by permit to regulate numbers is the accepted control method. A mixture of fresh cow dung and lime has proved an effective repellent of small antelope.

As a matter of interest, it may be mentioned that many farmers are establishing herds of antelope on their farms which are cropped annually, thus rendering a good financial return and at the same time promoting wild-life conservation.

In concluding this list of the more important problem mammals, mention must be made of two species - the Porcupine (Hystrix africa-australis) and the Antbear (Orycteropus afer) which cause the stock farmer considerable trouble as a result of their unfortunate habit of burrowing under jackal-proof stock fences and thus providing easy access for jackals.

Birds: It has been estimated that some 750 species of birds are to be found in the Republic of South Africa. Some of these, when present in excessive numbers, constitute a real problem to farmers. The most notorious example is the red-billed quelea (Quelea quelea) which descends in vast flocks on the grain lands of the northern Cape, Free State and Transvaal. Farmers in the south western wheat belt experience damage from the Red Bishop bird (Pyromelana orix) but this is to a much lesser degree and is localized to fields in the vicinity of reed beds. Control of the quelea has been undertaken by the State Department of Agricultural Technical Services and the methods used include aerial spraying and dynamiting of the roosting areas. The distribution of poison bait in defined feeding areas is not recommended as many harmless song birds and game birds are also killed.

The European starling (Sturnus vulgaris), introduced into the Cape about fifty years ago, has now established itself firmly and is extending its range up the coast. Although they live mainly on insects, they cause seasonal damage in orchards. Their favorite nesting site is under the eaves of dwellings which then frequently become contaminated by mites. Consequently, these birds are most unpopular and control measures are essential.

From Table I it will be noted that during 1956 bounties were paid on 5,600 crows. No discrimination was made between the three species of large blackbirds which are found in the Cape viz., the Cape raven (Corvultur albicollis), the pied crow (Corvus albus) and the black crow (Heterocorax capensis). The latter species is generally regarded as being a harmless scavenger but the pied crow is increasing in numbers and range and is said to attack sheep which are lambing and the new born lambs. This subject has been investigated by Siegfried (1963), who states:-

"The evidence collected indicates that in many cases the condemning charges levelled against crows cannot be substantiated. Damage to livestock during years of normal rainfall almost always takes place when the animals are diseased, undernourished or physically disabled - these faults are more often than not caused by inefficient and abusive methods of stock farming.

Damage to livestock during the lambing period can be minimal if the animals are in good condition and are allowed to lamb in fenced camps, under supervision.

Conventional methods of farming in marginal areas are bound to be less successful during times of drought - crow damage becomes more apparent during years of sub-normal rainfall but is probably directly related to the condition of livestock."

* Dermanyssus gallinac

Control of these birds by means of poison bait is relatively simple.

South Africa has a remarkable variety of birds of prey including vultures, eagles, hawks, owls and the secretary bird (Sagittarius serpentarius). Bounties have been paid on eagles since the early days and hawks were indiscriminately shot on sight until a few years ago. Today we are proud of the fact that all birds of prey are protected in the Cape Province. The local authority may issue permits to shoot birds causing damage. The only birds of prey that cause any real damage are the martial eagle (Polematius bellicosus) and the black eagle (Pteroaetus verreauxi). Siegfried (1963) who also investigated this problem, concludes that the black eagle is the major predator, but that its depredations are confined to lambs up to 7 weeks of age. Total losses do not exceed 0.1% of the sheep population. These losses can be reduced by penning the young lambs.

Occasional damage in orchards and vineyards by birds such as the red wing starling (Amydrus moris) and the Cape Sparrow (Passer melanurus) is increasing and some control of excessive populations of these birds may become necessary. As yet I do not know of a satisfactory or selective method of control.

CONCLUSION.

While the control of problem animals is recognized as being essential, their extermination is neither desirable nor practicable. Predators perform a very useful function in their natural environment and it is only when they become too numerous that they constitute a problem. All forms of wildlife are members of a biotic community with intricate inter relationships. We cannot conserve only those animals and plants which we consider of value to man and disregard the others. A program of total extermination, particularly of minor predators such as bat-eared foxes and mongooses would in time lead to excessive populations of rodents and insects which might prove more difficult and expensive to control. In addition, the more intensive predator control operations become, the higher the cost until eventually they reach the stage where they become prohibitive. We aim at the CONTROL of predators and other problem animals and not their extermination.

The problem animals listed in this paper form part and parcel of the incomparable wildlife of Africa. They are our heritage and one of which we are justly proud. The Karroo will have lost something irreplaceable should the call of the Jackal no longer be heard on a calm moonlight night! Consequently, it is our endeavor, while applying the most efficient control techniques in order to reduce crop damage to a minimum, to ensure that no species is exterminated in the process.

REFERENCES.

1961. Allison, M. Report of Predator Control Activities. Annual Report of the Department of Nature Conservation of the Cape. p. 92.
1962. Hanse, W. Preliminary Studies on the Dassie. Its relation to Farming and Methods of Control. Annual Report of the Department of Nature Conservation of the Cape. p. 108.
1959. Hey, D. Animal Control in the United States. Annual Report of the Department of Nature Conservation of the Cape. p. 107.
1962. Hey, D. A Nature Conservation Handbook. Department of Nature Conservation, Cape Provincial Administration.
1963. Siegfried, W. R. Investigational Report No. 4, Department of Nature Conservation, Provincial Administration of the Cape of Good Hope. A Preliminary Evaluation of the Economic Status of Corvidae and their Control on Sheep Farms in the Great Karoo.
1963. Siegfried, W. R. Investigational Report No. 5. Department of Nature Conservation, Provincial Administration of the Cape of Good Hope. A Preliminary Report on Black and Martial Eagles in the Laingsburg and Philipstown Divisions.

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