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~~DEATH CAMAS~~

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**WEEDS POISONOUS
TO LIVE STOCK**

DEATH CAMAS

Published by Direction of the

HON. D. A. URE

Minister of Agriculture

Edmonton:

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FOREWORD

The publication of this bulletin was first undertaken in 1919. It was prepared by Dr. P. R. Talbot, V.S., M.D.V., the Provincial Veterinarian, and J. C. Hooper, M.A., who at that time was Provincial Biologist. The present issue is a reprint of the publication as it was first issued with revisions and additions in 1951 by Dr. E. E. Ballantyne, Director Veterinary Services, Alberta Department of Agriculture.

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PREFACE

Poisonous weeds have caused heavy losses of live-stock in the past and a few still occur annually on the ranches and farms of Alberta. Many ranchers and stockmen are not acquainted with the various poisonous weeds. Consequently, they are not able to use measures to prevent stock from eating poisonous weeds, or to give proper treatment to poisoned animals. In suspected plant poisoning cases it is recommended that a veterinarian be called to investigate, since certain infectious diseases often produce similar symptoms. When animals die, a post mortem can be held, all changes in the tissues noted, and specimens taken for laboratory examination if necessary.

This bulletin has been prepared to give information required for the identification of the most dangerous poisonous weeds found in Alberta, the methods of handling to prevent stock from eating these weeds, and the symptoms and treatment of animals affected.

It is hoped that by application of the information supplied in this publication, ranchers and stockmen will be able greatly to lessen losses of live stock due to the eating of native poisonous plants.

INTRODUCTION

The poisonous weeds of Alberta found to be most dangerous to live stock are: Tall Larkspur, Low Larkspur, Death Camas, Water Hemlock, White Loco-weed, Woolly Loco-weed, and Showy Loco-weed. These poisonous weeds may occur on ranges and other grazing areas, and may be found in hay cut on native prairie meadows. When stock are grazing on ranges and pastures there are several circumstances which tend to increase the danger of plant-poisoning.

The poisonous weeds usually begin to grow early in the spring, offering green, succulent forage before the native grasses have made much progress. Hence, stock may be tempted to eat this poisonous food before good forage becomes plentiful.

In the early spring months, during rainstorms and late snowstorms, stock often seek shelter in coulees and ravines. Certain poisonous weeds, especially the tall larkspur, grow in these locations, and stock are thus exposed to these plants, when they are very poisonous.

After snowstorms, grazing plants are often covered and only the poisonous plants are left standing above the snow.

When stock come out from their places of shelter, in which they have been during long-continued rains, they are then very hungry, and exercise little discrimination in their choice of forage.

It is believed that certain plants are more poisonous when wet with rain or dew than under other conditions.

When the ground is wet after rainstorms, animals can much more readily pull up the roots and bulbs of plants, as they pull or nip off the stems and leaves. In some plants, such as the water hemlock, a great deal of the poisonous principle is contained in the rootstock and roots, and in the case of the death camas much of the poisonous principle is contained in the bulb.

It is also possible that storms accompanied by winds may beat down the weeds and the grass together, so that stock cannot distinguish them readily.

During dry seasons, on dry areas, and on stony, gravelly locations pasture may become scarce, and stock then do not exercise a choice in the food they eat.

The greatest losses of sheep from poisoning occur when sheep are being transferred from one range to another. This is due to the fact that they cannot make the same choice of forage while being hurried over the range as they can when they are allowed plenty of time to spread out and to select their food. When sheep are being trailed from one range to another, they should be handled in such a way that they never become very hungry at any time. Before they begin to move they should be allowed to fill up. Each night, herders should see that the sheep are "bedded down" in the

best pasture obtainable. Then in the morning good pasture will be near at hand and the sheep can begin grazing early. The action of the poisonous principle seems to be more rapid when the sheep are hungry and hot.

METHODS OF HANDLING TO PREVENT STOCK FROM EATING POISONOUS WEEDS

Eradication of the Poisonous Weeds.—

Cultivation will destroy all the native poisonous plants. In localities where it is desirable or possible to cultivate, weed-infested areas may be broken and sown to some good grass mixture. The kinds of grasses used in the mixture will depend upon their suitability to the particular district.

In localities where it is neither desirable nor possible to cultivate, the plants may be grubbed or dug out. When poisonous plants are grubbed out, the work should be done thoroughly.

Fencing the Weed-Infested Areas.—

Weed-infested areas are sometimes enclosed, or are shut off from the rest of the range by means of a strongly built fence. Such areas may sometimes be used as pasture for animals not affected by the particular weed enclosed or shut off. For example, sheep and horses may be turned into a tall larkspur area even in the dangerous period with practically no danger of loss. The areas may be thrown open to all stock when the dangerous periods are past.

Herding the Stock Away from Poisonous Areas.—

Riders may be employed during the dangerous months to herd stock away from poisonous areas. If this method is used, riders should herd the stock carefully during stormy weather in spring and early summer.

Value of Minerals.—

The lack of salt or minerals will cause a depraved appetite in animals. If such develops, the animal will eat poisonous plants that it possibly would not touch if its appetite was normal. Animals should be supplied with salt regularly and abundantly.

In a great many districts of Alberta a depraved appetite will also develop from a lack of other minerals such as calcium and phosphorus. This is commonly supplied by making bonemeal available at all times in a box or other container so the animals can take the amount needed.

The salt and minerals should not be near poisonous areas during the periods when the weeds are dangerous. The location of the salt blocks or other containers should be changed from time to time in order that the pasture near them may not be grazed down too closely, and only objectionable plants left. The feeding of iodized and cobaltized salt is better than plain salt and also necessary in many areas in Alberta.

Value of Good Water.—

Live stock should have access to plenty of good water. When stock

cannot get plenty of good water, they sometimes develop a depraved appetite. Strongly alkaline water should be avoided, as it is thought that it develops a perverted or abnormal appetite in stock.

General Precautions.—

Hungry stock exercise little discrimination in their choice of forage. If animals are in a very poor condition when they are turned out in the spring, they should be put on a range that is free from poisonous weeds. Every precaution should be taken to see that stock do not become too hungry at any time. A range should not be allowed to get pastured down too closely. When stock are to be moved after being unloaded from a train, they should be allowed to fill up on good hay before they begin to move. They will then be less likely to snatch at any or every plant as they are being transferred to the range. When stock are being driven across a range, they should not be hurried along too quickly.

WEEDS POISONOUS TO LIVESTOCK

LARKSPURS

Two kinds of larspurs are found in Alberta: (1) tall larkspur, called also poison, poison-weed, and cow-poison; (2) low larkspur, called also purple larkspur, and small larkspur.

TALL LARKSPUR

(*Delphinium glaucum*, or *Delphinium Brownii*, Rydb.)

The tall larkspur is an erect, rank-growing, smooth, green plant from two to six feet in height. The leaves are round in outline and deeply divided into lobes, the lower leaves being large and long-stemmed, while the upper ones are smaller, more finely cut, and shorter-stemmed. Rich bluish-purple flowers, with a curved spur on each, terminate the stalk.

The stalks of the tall larkspur occur singly, or in clumps of two or three, and grow from one or more crowns or upper parts of the roots. The stalks are smooth, green, or green with a tinge of purple, round, and hollow. When the stalks are young they are covered with a whitish coating. The lower three-quarters of the stalk bear the leaves, while the upper part bears the bluish-purple flowers.

The leaves of the tall larkspur are smooth, green, circular in outline, but deeply divided into from three to five segments, each segment more or less cut into smaller ones. The leaves toward the base of the stem are large, from three to six inches in diameter, with leaf stems about four inches long. The upper leaves are smaller, having narrow lance-like segments, and much shorter leaf-stems.

The flowers of the tall larkspur are rich bluish-purple. At higher altitudes the blue color usually becomes more prominent. Each flower has a cone-shaped spur, half an inch long, curving upward, and resembling in shape the spur on a lark's foot. The length of each flower to the tip of the spur is about three-fourths of an inch and the width about half an inch. The flowers are arranged on a fairly open axis, six to eighteen inches long, which may be single or branched. (See Fig. 1, page 9). As the flowering-axis continues to grow throughout the growing season, we may find mature seeds at the bottom of the axis, while at the top the flowers are just opening.

The dry fruit, which contains the seed, is usually composed of three upright compartments, each opening lengthwise to allow the seed to escape. The seeds are brown, quite small, rough, and angular.

The root of the tall larkspur is perennial, that is, it may live more than two years. It is woody, and consists of a number of fibrous branches which grow to a depth of from six to eight inches. Each root has one or more crowns from which new stalks spring up year after year.

FIG. 1. Flowers of tall larkspur.

Where the Tall Larkspur is Found.—

The tall larkspur is found in the foothills, and along the mountain sides, at an elevation of from four thousand to nine thousand feet. It grows very plentifully in the underbrush of poplar and willow scrub which occurs usually on those slopes of hills and coulees facing the north and east. The tall larkspur grows most abundantly within half a mile of some creek, ditch, or spring. It requires shade and a rich, fairly moist, well-drained soil.

In the Dominion Forest Reserves we have observed the tall larkspur growing abundantly beneath poplar and willow scrub that occurs in the timber.

FIG. 2. Clump of young tall larkspur. One-eighth natural size.

Seasonal Growth.—

In the southern part of the Province the young stalks begin to shoot up early in May. About the tenth of May the tips of the young stalks may be seen when the dead leaves are pulled away. Usually by the twenty-fourth of May, they are about six inches high, bearing several green, succulent leaves. (A photograph of a young clump of tall larkspur as it appears about the middle of June is shown above, in Fig. 2.) The stalks reach their maximum height by the end of July. The flowering period usually begins early in July and ends early in August. The mature seeds have fallen to the ground usually by the end of August. In the northern part of the Province the tall larkspur is from one to two weeks later in starting to grow.

Throughout the whole of Alberta, however, the seasonal growth of the tall larkspur is governed by the altitude, and the climatic conditions of the spring and of the summer.

PLANTS COMMONLY MISTAKEN FOR THE TALL LARKSPUR

The Wild Pink Geranium

(*Geranium Bicknellii*, Britton) is commonly mistaken for the tall larkspur in the spring and early summer before the leaves have appeared. (See Fig. 3, below). In general shape the leaves of the geranium resemble very much those of the tall larkspur. The leaves of the geranium, however, are

FIG. 3.—Wild pink geranium. This plant is commonly confused with the tall larkspur during early spring.

covered with fine white hairs, and when the leaves are pinched between the fingers they give the characteristic geranium odour. The leaves of the larkspur are smooth and do not give the geranium odour. The flowers of the geranium are pink, and have no spur. The wild pink geranium is not poisonous.

The Tall Anemone

(*Anemone virginiana*, L.).—The leaves of the tall anemone during the early stages of growth are very commonly mistaken for those of the tall larkspur. The leaves of the anemone, however, are smaller and grow in a clump from the part of the stem at the surface of the ground. The tall larkspur has no such clump of leaves arising at the surface of the ground. The anemone grows from nine to eighteen inches high, and has a single white flower at the top of the stem. The tall anemone is not poisonous.

Parts of the Tall Larkspur that are Poisonous.—

All parts of the tall larkspur are very poisonous, but the young stalks and leaves cause the greatest loss of cattle.

Animals Which are Subject to Poisoning by Tall Larkspur.—

The tall larkspur is probably one of the most destructive of the poisonous plants that we have in Alberta, especially in the southern part of the Province. Each year large numbers of cattle are lost in the foothills pastures. From what is known at the present it is thought that horses are occasionally poisoned by it, but the losses in horses are insignificant.

Symptoms.—

The first symptom in cattle will probably be the sudden falling of the animal. When cattle have been feeding on pasture which contains larkspur and are started up suddenly or are driven rapidly from the spot where the plant has been eaten, the symptoms seem to develop quickly. There is usually a general stiffness of the legs and a difficulty in walking which causes the affected animal to lag behind the herd and finally lie down. In many cases it will regain its feet, stagger along with its hind legs spread widely apart, only to fall after a few steps in violent convulsions. Spasmodic twitching of the muscles of the sides of the legs appears intermittently.

In very severe cases the affected animal will lie flat on the ground, occasionally raising the head and letting it fall again. In mild cases the animal may lie practically normal with the head held erect, but with muscular tremblings well marked. As the heart and the respiratory organs are affected, the pulse will be feeble and the respirations shallow.

Occasionally an animal may fall once, lie prostrate upon the ground for a short time, apparently recover and walk off, to all appearance as if nothing had happened.

Animals poisoned by larkspur are nearly always constipated. In practically all severe cases the animals are nauseated, and vomiting and belching gas is a common symptom. Bloating is present in many animals, but not in all. Copious drooling or slobbering is also quite commonly met with.

Treatment.—

A large number of animals are poisoned by larkspur on the range, and are already dead before being discovered. Fortunately, however, it is very frequently possible to apply remedies that will lead to recovery. Numerous cases are on record where, in mild poisoning, the animal after it falls has been so placed that the head is kept in a higher position than the rest of the body, and being kept perfectly quiet, recovery has taken place without any medical remedies being applied at all. Attempts to raise the animal upon the feet, or to disturb it in any way, is almost always followed by fatal consequences. As stated previously, bloating is common and should be relieved by tapping with a trocar and cannula into the first stomach. At one time bleeding was supposed to give beneficial results. It is doubtful if it has any value whatever, many claiming that it only produces weakness, and makes recovery less probable. Experiments tried out with potassium permanganate and aluminum sulphate have done good in many known and observed cases.; on the other hand many condemn it as utterly useless. Experiments carried out in Experimental Stations in the United States have given beneficial results from the subcutaneous injection of the following:

Physostigmin Salicylate	1 grain.
Pilocarpin Hydrochloride	2 grains.
Strychnine Sulphate	1½ grain.

This preparation may be obtained from a veterinarian or drug store in veterinary hypodermic tablets. The tablets should be dissolved in about four ounces of water purified by boiling and carefully injected under the skin with a hypodermic syringe. A good purgative is always in order to bring about a rapid clearing of the intestines. If an animal does not recover, death usually occurs in a few minutes.

Methods of Preventing Cattle from Eating Tall Larkspur.—

In order to prevent cattle from eating tall larkspur, ranches and stockmen must locate all the tall larkspur areas on their ranges and then use one of the following three methods: (1) fencing; (2) grubbing out; (3) herding.

(1) FENCING METHOD.—By this method each tall larkspur area is shut off from the rest of the range by means of a strongly-built barbed-wire fence. The cattle can thus be shut out of these areas until the poisoning period is past. The tall larkspur areas may be used as horse and sheep pastures, as these animals are not poisoned to any extent by the tall larkspur. No definite date can be set when the plant ceases to be poisonous, because its maturity varies with the locality and the conditions of the season. If the plants have passed the flowering period and have matured their seed, tall larkspur areas may usually be considered safe for cattle.

In most localities in Alberta these areas may be regarded as safe for cattle between the middle and the end of August.

(2) GRUBBING-OUT METHOD.—By this method all the tall larkspur roots are grubbed or dug out. The effectiveness of the grubbing-out depends upon the thoroughness with which it is done. All tall larkspur roots must be cut off about eight inches below the surface of the ground, so that none will be left to send up stems the following spring. The best time to dig out the roots is during the flowering period, and the work should be completed before the seeds begin to ripen. The roots and the stems should be collected, removed beyond the reach of cattle, and when dry, they should be burned. Even although this grubbing is done very thoroughly, it may nevertheless be necessary to grub the area the following year. The cost of the second grubbing will be small. The areas will then be completely rid of the tall larkspur.

(3) HERDING METHOD.—By this method riders are employed during the months of May, June, July, and part of August, to herd the cattle away from the tall larkspur areas. The riders must herd the cattle carefully, especially during stormy weather, because at these times they are most likely to drift into coulees for protection and thus get into the brush and timber where the tall larkspur may occur. If the cattle are driven out of such areas shortly after entering them, ill-effects may possibly not result.

On large ranges where the tall larkspur areas may be numerous, and great in extent, it is usually most economical to use the fencing method. On smaller ranges the grubbing-out method, which is the most effective method, may be used. Herding cannot be recommended so strongly as either of the other two methods.

LOW LARKSPUR

The low larkspurs are represented in Alberta by two species, viz: *Delphinium bicolor*, Nutt, or *Delphinium Menziesii*, D.C., and *Delphinium azureum*, Michx.

Low Larkspur

(*Delphinium bicolor*, Nutt.)—This low larkspur is a slender, slightly hairy, perennial plant from five to eighteen inches high, with several large dark-purple flowers terminating the stem. Each flower has a conical spur about three-quarters of an inch long, and slightly curved. The length of the flower is from one to one and a half inches. The two small upper parts of the flower are pale yellow with blue veins. The stems are slender, unbranched, and covered with fine short hairs. The leaves at the base of the plant are few in number, long-stemmed, and very deeply divided into five segments, which are again more or less divided into narrow segments. The

leaves higher up on the stem are very few in number, and are very deeply divided into narrow segments. The roots are tuberous and perennial.

Where the Low Larkspur is Found.—

The low larkspur is found along the foothills on open land, usually in full sunlight. It grows on hillsides and on the higher banks of creeks. It may be found at all altitudes up to ten thousand feet. It is found usually within a few hundred yards of scrub or timber. The low larkspur requires a fairly rich, fairly moist, well-drained soil.

Seasonal Growth.—

The low larkspur begins to grow early in May. Blossoms appear the latter part of May and during June. The seeds are mature in June and

Purple Larkspur.

July. The fruit and seed are quite similar to those of the tall larkspur already described.

Parts of the Low Larkspur that are Poisonous.—

All parts of the low larkspur are poisonous.

Low Larkspur

(*Delphinium azureum*, Michx.).—The stems of this low larkspur are much stouter than those of *Delphinium bicolor* already described. The leaves are very deeply cut into fairly wide segments. The whole plant is

densely covered with fine, short, silky hairs. The stems grow from one to two feet in height. A very close cluster of bluish-purple flowers terminates the stem. The spur on each flower is quite stout, curved, and points downward. The roots are tuberous.

Animals Subject to Poisoning by Low Larkspur.—

The low larkspur in this Province seems to be poisonous principally to sheep and calves. Fortunately there are very few areas where the low larkspur is found, and losses from this plant are not frequently reported. The symptoms are similar to those produced by the tall larkspur.

DEATH CAMAS

(*Zygadenus venenosus*, Rydb.).

The other common names by which the death camas is known in Alberta are poison camas and mystery grass.

The death camas is a slender, grass-like plant having a cluster of from five to seven pale-green, narrow, grass-like leaves. In the centre of this cluster is an erect flower-stem from five to twenty inches high, with numerous small greenish-yellow flowers. The leaves and the flower-stem grow from a perennial, underground, onion-like bulb.

The leaves are from five to fifteen inches long, narrow and grass-like. They are somewhat rough, and have a distinct ridge running along the middle of the under surface. The leaves are thicker and more fleshy than those of grasses, and hence are more tempting to stock.

The flowers are greenish-yellow, lily-like, and about one-quarter of an inch in diameter. The flowers grow from different points along the upper part of the flower-stem, forming a fairly close cluster. The flower-stem grows in height during the flowering season and hence the flowers become apart as the season advances.

The bulb, from which the leaves and the flower-stem grow, is situated from two to four inches below the surface of the ground. The bulb is covered with thin, membranous, brown coats. The interior of the bulb is very similar to that of an onion, being composed of white fleshy layers, which can be separated from each other. The bulb varies in length from one to one and a half inches. At the base of the bulb there are several fibrous roots similar to those occurring at the base of an onion.

Where the Death Camas is Found.—

The death camas is found on the open prairie, and on open land on the sides of hills and in coulees and ravines.

Seasonal Growth.—

The time at which the plants begin to grow in the spring depends on the weather conditions. They are usually found first on open, fairly moist

slopes facing the south. The flowers appear in May and June and the seeds mature in June and July.

**Plants Commonly Mistaken for Death Camas.—
The Wild Onion**

(*Allium reticulatum*, Don.) is a plant which is very commonly mistaken for the death camas. There are, however, three points of difference between the two. The bulb and the rest of the wild onion plant have the characteristic onion odour, which is absent from the death camas. The flowers of the wild onion are pink, or pinkish-white, while those of the

FIG. 4. Death camas on the left, and wild onion on the right.

death camas are greenish-yellow. All the flowers of the wild onion grow out from one point at the tip of the flower-stem, whereas in the death camas the flowers grow from different points along the upper end of the flower-stem. (See Fig. 4, above). The wild onion is not poisonous to stock.

The Swamp Camas

(*Zygadenus elegans*, Pursh.) resembles the death camas in general appearance, but is a much coarser plant, owing to the fact that it is usually found in moister locations.

The leaves of the swamp camas are wider and longer than those of the death camas. The flower-stem is higher, and the flowers are larger and farther apart on the flower-stem. The swamp camas has the same poisonous principle as the death camas, but being coarser is very seldom eaten by stock.

Parts of the Death Camas that are Poisonous.—

All parts of the plant contain the poisonous principle. The bulbs especially are very poisonous. When the soil is wet, there is a greater likelihood of stock pulling up the bulbs.

How the Death Camas Spreads.—

The death camas spreads over new areas by means of its seeds. The seeds germinate in spring, and during the growing season produce grass-like plants with small bulbs. The next spring each bulb sends up leaves and a flower-stem.

Animals Which are Subject to Poisoning by Death Camas.—

All classes of stock that eat this plant are said to be injuriously affected by it, but apparently in this Province sheep alone are poisoned by it.

Symptoms.—

Probably the first symptom of poisoning will be stiffness in the legs and difficulty in walking. There will be also a disposition on the part of the sheep to straggle from the rest of the flock. Frothing at the nose and mouth, rapid breathing, increased flow of saliva, regurgitation through the nose and mouth, sudden jerking of the head and intermittent spasms follow in rapid succession. Finally muscular paralysis takes place, the animal is down and unable to rise, and a profound insensibility sets in from which the victim never recovers.

Treatment.—

No satisfactory remedy has been found. Animals which are kept quiet may recover if they have not eaten too much. Tannic acid $\frac{1}{2}$ dram and soda bicarbonate 1 dram dissolved in $\frac{1}{2}$ pint of water may be helpful. The solution is given as a drench in repeated doses $\frac{1}{2}$ hour apart. Hungry animals are the most likely to be poisoned.

Methods of Preventing Stock from Eating Death Camas.—

Care should be taken to see that stock are not tempted to eat death camas. The range should never be pastured down too closely. Observation of numerous cases leads to the conclusion that practically all losses occur when stock have been turned hungry upon pasture badly infested with death camas. Sheep, especially, should be given proper care when being transferred across a range where the death camas grows at all abun-

dantly. Heavy losses have occurred when sheep have been allowed to consume large quantities of the plant while being driven across an infested area to the regular pasture ground. They should be allowed to fill up on good forage before they begin to move. Early in the morning they should be allowed to graze on good pasture before starting out.

If only small patches of death camas occur on the range, the plants may be grubbed out by loosening the soil with a spade, and then pulling out the bulbs. The plants should be grubbed out during the flowering period, as it is very difficult to distinguish the death camas plants from grasses, when the death camas plants are not in flower. The grubbing-out is most easily done when the soil is moist.

Since cultivation of the land readily eradicates death camas, it is sometimes advisable to break the land, and sow to some good grass mixture suitable to the district.

WATER HEMLOCK

(*Cicuta maculata*, L.).

The other common names by which the water hemlock is known in Alberta are poison parsnip, wild parsnip, cowbane, and beaver-poison.

The water hemlock is a tall, erect, marsh plant from two to six feet high. It may be regarded as a perennial. The stems are fairly stout, streaked with purple, bearing a few pale-green, doubly compound leaves, and many quite flat clusters of very small, greenish-white flowers.

The stems are green, streaked with purple, smooth, and hollow, except at the joints where the leaves are attached to the stem. (See Fig. 5, page 20). The stems occur singly, or in small clumps of from two to six, and spring up from the underground part of the stem, or rootstock. The rootstock is short, thick, somewhat spherical, and varies in diameter from half an inch to three inches. The interior of the rootstock is clearly divided by partitions into chambers running at right angles to the main stem. (See Fig. 5, page 20). In the spring these chambers are filled with a liquid, but later they become empty.

The root of the water hemlock consists of a bunch of fleshy, tapering projections attached to the rootstocks. These fleshy projections spread out in different directions, and vary in number from three to ten. Each projection is shaped like a small parsnip. All the projections have about the same diameter, but vary in length from two to five inches. The roots usually grow quite close to the surface of the ground.

The leaves of the water hemlock are pale-green. They are doubly compound, each leaf consisting of many leaflets appearing as individual

FIG. 5. Longitudinal section of a portion of the stem of water hemlock, and of the rootstock showing cross-partitions.

leaves. The leaflets are lance-shaped, narrow, pointed at the upper end, deeply toothed, and varying in length from two to five inches. The lower surface of each leaflet is clearly veined.

FIG. 6. Flowers of water hemlock. One-third natural size.

The flowers of the water hemlock are small and greenish-white. They are arranged at the tops of the branches of the stalks in dense flat-topped clusters from one to four inches across. (See Fig. 6, above). These large clusters are each composed of from fifteen to thirty-one smaller clusters. In each small cluster there are from sixteen to thirty-three tiny greenish-white flowers. The fruit formed from each flower is small, ribbed, somewhat flattened on the sides, and about one-twelfth of an inch long. At maturity the fruit separates into two boat-shaped parts.

Where the Water Hemlock is Found.—

The water hemlock is found in local patches throughout Alberta in the foothills and on the prairie, always in low, wet, marshy land. It occurs along creeks, irrigation ditches, along the edges of sloughs and lakes, and in low meadow land. It is always more plentiful after a series of wet years.

FIG. 7. Water hemlock plants (showing their typical manner of growth with other vegetation).

Seasonal Growth.—

The water hemlock begins to grow in May. At first, pale-green shoots are seen. Later on, leaves appear, spreading out from a pithy stem, which afterwards becomes hollow. The flowers appear in June, and continue during July and early August. The seeds are ripe in August and early September.

Plants Commonly Mistaken for the Water Hemlock.—**Water Parsnip**

(*Sium cicutaeifolium*, Schrank.).

The water parsnip is an erect, branching plant from two to five feet high, and grows in low, wet places along the borders of sloughs and lakes,

and along creeks and irrigation ditches. The leaves of the water parsnip are compound, the leaflets being attached in pairs along the leaf-stem. The leaflets are narrow, lance-shaped, with sharply toothed edges. The difference between the leaf of the water hemlock and the leaf of the water parsnip may be seen by looking at Fig. 8, below. The roots of the water parsnip are fibrous, consisting of a number of separate slender parts. The water parsnip is not poisonous.

FIG. 8. On the left, compound leaf of water parsnip. On the right, doubly compound leaf of water hemlock. One-third natural size.

Cow-Parsnip

(*Heracleum lanatum*, Michx.)—This plant is often called wild rhubarb.

The cow-parsnip is a very large, stout, erect plant from four to six feet high. The leaves are very large, each being composed of three large separate parts called leaflets, which are densely covered on the lower surface with fine white hairs. The small white flowers are arranged in very large flat clusters at the tops of the branches of the stalks. The cow-parsnip is found in the underbrush of poplar and willow scrub, and also on open land in rich woodland meadows. The cow-parsnip is not poisonous.

Sweet Anise

(*Washingtonia longistylis*, Torr.)—The sweet anise is an erect, branching plant from two to three feet high. It is found in the shade of

poplar and willow scrub, or of timber. It is usually found along a creek or in some other moist location. The leaf is quite similar to that of the water hemlock in general shape. The leaflets of the sweet anise, however, are thinner, broader and more coarsely toothed than those of the water hemlock. The sweet anise is not poisonous.

Parts of the Water Hemlock that are Poisonous.—

The root-stock and roots contain the greatest amount of the poisonous principle, cicutoxin. It is known that also the lower parts of the stem contain some of the poison, and that the leaves and stems of young plants contain quite a good deal of the poison.

It has been proved that dried water hemlock plants, found in hay cut on native prairie meadows have been poisonous to stock.

How to Prevent Stock from Eating the Water Hemlock.—

The best method consists in grubbing out the roots. As the grubbing can be done quite easily, several acres may be freed from the water hemlock at a comparatively small cost. The roots should be placed beyond the reach of stock and when dry they should be burned. The grubbing should be done in early summer before new seeds have matured.

It has also been found quite practical to fence off the infested area by a strongly-built fence.

Animals Subject to Poisoning by Water Hemlock.—

Cattle are the most frequent sufferers from water hemlock poisoning, with horses and sheep occasionally, but under certain conditions it is well to remember that it is dangerously poisonous to all classes of stock.

Symptoms.—

The poison contained in the root acts rapidly and is deadly. The first symptoms frequently appear in 30 to 60 minutes after the root has been eaten, but where only a small quantity is taken the animal may linger along for two or three days and in some cases eventually recover. The first irregular condition noticed will be a frothing at the mouth accompanied by pronounced uneasiness. When the animal falls to the ground violent convulsions take place, accompanied by the clamping of the jaws and gnashing of the teeth. In some animals great distress and excitement are manifested and during the period of convulsions they will bellow and groan with pain. The breathing is often hurried and irregular, the pulse rapid and weak, there will be well marked dilatation of the pupil of the eye, and a gradual stiffening of the legs with the head and neck frequently bent backward. The intervals between the convulsions vary as to duration and intensity, the periods gradually becoming shorter, however, until coma takes place and death ensues.

Post-mortem Appearances.—

There is usually well-marked congestion of the lungs, this being brought about by paralysis of the respiratory muscles and producing death

by asphyxiation. Usually the mucous membrane of the stomach is inflamed and parts of the plant may be identified in the stomach's contents.

Treatment.—

Any single type of treatment of water hemlock poisoning has been found very unreliable. Remedies which effect a cure in one case prove a failure in others. For cattle the administering of potassium permanganate, 1 dram, and aluminum sulphate, 1 dram, dissolved in water, administered as a drench, has given beneficial results in some cases. Large quantities of melted lard, raw linseed oil or milk have been tried with varying success.

Veterinary treatment using a stomach tube and a quick acting purgative by hypodermic will help in some cases. Ordinarily, nothing can be done unless an early start is made, but there is hope of saving some animals that have not eaten a very large piece of the root. Usually though the animal is found dead because the poisonous substance works very quickly. A piece of root the size of a walnut will kill a cow.

LOCO-WEEDS

Several species of loco-weeds are found in Alberta, those causing the greatest losses of stock being the white loco-weed, the woolly loco-weed, and the showy loco-weed.

White Loco-weed

(*Oxytropis Lamberti*, Pursh.).—The other common names by which this plant is known in Alberta are the stemless loco-weed and crazy weed.

The white loco-weed is a silvery-white plant from three to ten inches high, growing in tufts or bunches from a perennial root. The leaves are pinnately compound and always shorter than the flower-stem. It belongs to the legume or pea family, and has one or more clusters of yellowish-white flowers that resemble in shape those of the pea.

The leaves of the white loco-weed are from three to nine inches long, and grow in a slanting direction from several very short stems or crowns at the surface of the ground. The crowns cause the plant to have a bunching or tufted appearance. The leaves are compound, each leaf consisting of from nine to nineteen separate parts called leaflets. The leaflets are arranged in pairs along the leaf-stem with a single leaflet at the end. They are small, narrow, and covered with fine, silvery-white, silky hairs.

The flowers of the white loco-weed are shaped like those of the pea. They are yellowish-white, fairly large, and are arranged in a close cluster at the top of the flower-stem. (See Fig. 9, page 26). The flower-stem is from three to ten inches high, has no leaves and is unbranched. Within each flower two of the yellowish-white petals are united, forming a keel

which is partly concealed by the remaining three petals. At the end of the keel there is a slender spur about one-eighth of an inch long. This spur serves to distinguish the white loco-weeds from false loco-weeds. (See

FIG. 9. White loco-weed. One-half natural size.

Fig. 10, page 27). The spur on the keel of the flower must not be confused with the spur at the end of the seed-pod.

Each flower produces a pod somewhat swollen or bladder-like, and containing several seeds. There is a short curved spur at the end of each pod. The plant spreads over new areas by means of the seed.

The root of the white loco-weed is perennial, that is, it may live more than two years. It is tough, woody, and rough. It consists of one main

division, varying in depth from six to twelve inches, and several short branches, which branch up from the main division not far below the surface of the ground. These short branches grow up to the surface of the ground, and appear there with one or more silvery-white crowns, covered with scale-like leaves, from which the leaves and the flower-stems grow. (See Fig. 11, page 28.)

Where the White Loco-weed is Found.—

The white loco-weed is found principally along the foothills at altitudes up to eight thousand feet, on open land on the sides and tops of the higher hills. It is found also on the open unbroken prairie.

In both locations it grows among the native grasses, in rather dry places on stony, gravelly, or sandy land. It grows in abundance on the tops of some hills, and when animals become locoed they usually remain on these hills eating the loco-weed almost exclusively.

FIG. 10. (a) Flower of white loco-weed, showing spur on end of keel petal.
(b) Flower of false loco-weed, showing keel petal without spur.
One and one-half natural size.

Woolly Loco-weed

(*Astragalus mollissimus*, Torr.).—The woolly loco-weed is white and woolly in appearance, and its flowers are deep purple. The general shape of the plant is very similar to that of the white loco-weed. (See Fig. 12, page 29).

The leaves grow from several soft, white, scaly crowns at the surface of the ground. They vary in length from four to nine inches, and are shorter than the flower-stems. Each leaf consists of numerous narrow, sharp-pointed leaflets, which are closely arranged along the leaf-stem. The leaflets are very densely covered with fine, white silky hairs, giving the whole plant a soft, white, woolly appearance.

The flowers are deep purple, about half an inch long, and occur in close clusters at the tops of the flower-stems, which are leafless and unbranched. The flower-stems are also covered with fine, white, silky hairs, and are from six to fourteen inches high.

The root of the woolly loco-weed is very similar to that of the white loco-weed. It has one main root growing to a depth of from five to twelve inches. Near the surface of the ground several branches grow up from the

main root, each bearing one or more crowns, covered with scale-like leaves, from which the leaves and the flower-stems grow. These crowns cause the plant to have a bunching or tufted appearance.

Each flower produces a pod covered with long, fine silky hairs. The pod is erect, and varies from one-half to three quarters of an inch in length.

FIG. 11. A white loco-weed showing manner of growth and arrangement of leaflets on axis of leaf.

Where the Woolly Loco-weed is Found.—

The woolly loco-weed is found along the foothills, on open land on hillsides and in valleys. It is found on the open prairie also. In both locations it grows on stony, gravelly, or sandy land, and always among native grasses.

Showy Loco-weed

(*Astragalus splendens*).—This loco-weed has rich purple flowers and is very similar to the other loco-weeds already described.

Parts of the Loco-weeds that are Poisonous.—

All parts of the plants are poisonous. When animals get the loco-

FIG. 12. Woolly loco-weed.

eating habit, they eat not only the leaves and the flower-stems, but also the crowns and as much of the root as they can nip or pull off.

PLANTS COMMONLY MISTAKEN FOR LOCO-WEEDS

The Yellow Oxytropis

(*Oxytropis campestris*, L.).—The yellow oxytropis resembles the white loco-weed in the color of the flowers, in the shape of the leaves, and in the general shape of the plant. It differs from the white loco-weed in that it has wider leaflets, and fewer silky hairs than has the white loco-weed. The yellow oxytropis has only a very tiny spur on the keel of each flower.

The Silvery Lupine

(*Lupinus argenteus*, Pursh.).—The silvery lupine is sometimes mistaken for the loco-weeds. It is a bushy branching plant, also belonging to

FIG. 13. Showing the arrangement of the leaflets of the lupine on the left, and a typical leaf of the loco on the right.

the legume or pea family. It grows from one to two feet high, and has a silvery color owing to the leaves and stem being densely covered with fine, short, silvery hairs. The flowers are pale-blue and are arranged in clusters at the ends of the stems and branches. The leaves are compound, each leaf consisting of from five to nine leaflets. The silvery lupine may be distinguished from the loco-weeds by the manner in which the leaflets are at-

tached to the leaf-stem. The leaflets of the silvery lupine radiate out from the end of the leaf-stem like the outstretched fingers from the palm of the hand, whereas the leaflets of the loco-weed are arranged along the leaf-stem, with an odd leaflet at the end. (See Fig. 13, page 30). The lupines bloom in June and July, and the seeds mature in July and August. The seeds of the silvery lupine are very poisonous.

Animals which are subject to Poisoning by Loco-weeds.—

Of all the classes of stock affected by the loco-weeds, sheep probably are the chief sufferers, horses quite frequently, and cattle rarely. Young sheep and horses more commonly acquire the habit of eating the weeds than older animals and only in rare cases do we find old or full developed stock affected by them.

Symptoms.—

It is well to bear in mind that loco-poisoning develops slowly. The poison in the initial stages apparently affects the nervous system, which will account for the stupidity of the animal, the lack of muscular control when walking, and the failure to judge distances and objects accurately. In severe cases the animal loses both the sense of sight and the sense of hearing.

Affected horses usually wander from the herd and isolate themselves in some infested area where they will eat nothing else but the plant if it can be obtained. The coat becomes rough and shaggy, the gait staggering and slow, the teeth grow long and become loose. Not infrequently the affected animal walks around in circles always turning in the same direction, and apparently unable to go the opposite way. These attacks may pass off, to be followed by the recurrence of periods of stupidity succeeded by the same actions as before.

Sheep affected with loco-poisoning will frequently stand with their heads pressed firmly against some object for hours at a time apparently unable to move. There is usually arching of the back and well-marked tremblings. Not infrequently the wool is loosened in patches of various sizes over the body. In other cases a general shedding of wool takes place.

Treatment.—

Treatment for loco-poisoning is very unsatisfactory. In the case of horses, as soon as they commence to show signs of being locoed, they should be separated from the rest of the herd, put on good wholesome food and given Fowler's solution of arsenic in doses of two drams each, twice daily, in either the drinking water or bran mash, until recovery takes place. It will be found necessary to keep these horses confined at all times to corrals or stables, for, after once acquiring the taste for loco, if turned upon the range again it will be a matter of a very short time before they will be in as bad condition as ever.

Sheep just affected with loco-poisoning if given a good nutritious ration and confined to pastures absolutely free from the plant, may be fattened sufficiently to be placed upon the market. Magnesium sulphate, four ounces, dissolved in drinking water will assist in recovery.

Precautionary measures in connection with loco-poisoning are worthy of the utmost consideration. Animals which have plenty of good food rarely contract the habit. Overcrowding of the ranges and too close pasturing will force animals to eat plants which they otherwise would not touch. Recently a great deal of importance has been put upon the supplying of plenty of salt at all times. It is essential to all classes of livestock and no doubt will assist in preventing them from contracting a perverted taste.

Eradication of Loco-weeds.—

It is sometimes advisable to grub out the loco plants. To get rid of a loco plant it is not necessary to dig out the whole root; only the crowns need to be cut off. To make sure that the crown is cut off, cut the root with a spade two or three inches below the surface of the ground. The best time to do this work is in June and July, during the flowering season. The grubbing should be completed before the seeds ripen.

As the seeds may lie in the ground for several years before germinating, it may be necessary to grub the areas again during the following two or three years, to destroy any plants that may have grown from seeds. The cost of the second or third grubbing would be very small.

When the loco-weeds are confined to one or more hills, it may be possible to shut off the poison-infested areas from the rest of the range by means of a barbed-wire fence.

OTHER POISONOUS WEEDS

Timber Milk Vetch

(*Astragalus campestris*).—Timber Milk Vetch is found growing mostly in shade, on good soil, with moderate amount of moisture. Wide spread on the mountain slopes of B. C. and Alberta. It grows in rounded tufts, and has fine grass like stems, small narrow leaflets, and pea-like pinkish flowers on long slender racemes. Most abundant at 2000 to 4000 feet elevation.

During the dry seasons when other forage is short, all classes of livestock eat and suffer from Timber Milk Vetch poisoning. Milking or lactating animals suffer most and may have a death rate of up to 40 percent or more.

Symptoms.—

Staggering, and difficult breathing accompanied by wheezing, whistling or roaring and loss of voice in cattle or sheep. When the animal is made to move it shows signs of distress. The breathing becomes laboured and the nostrils fully extended. The animal perspires, staggers, falls and may roll. The mouth is wide open emitting foam, and the tongue becomes bluish in colour. These symptoms last from 10 to 15 minutes. Death may occur within a few days, or it may be delayed for weeks.

Prevention.—

During June, July and August, cows and ewes in milk should be kept above or below the range where this plant grows. Dry cows, dry ewes and male animals are not usually affected except in a very dry year.

Treatment.—

Treatment may prove disappointing, but recovery may occur. Remove affected animals, but do not hurry or excite. The use of *Nux Vomica* has proved beneficial in doses of 1 to 2 drams for cattle and 20 to 40 grains for sheep. Start with the smaller dose and give at least once or twice a day for two weeks. Discontinue treatment for a week if the animal becomes unduly restless or excited.

OTHER POISONOUS PLANTS

The foregoing are the main poisonous plants in Alberta which cause livestock losses. The following is a summary of other conditions that may result from animals eating certain plants.

Photosensitization

Consumption of alsike clover, buckwheat, St. John's wort and rabbit bush make an animal susceptible to photosensitization. This is actually an allergic reaction in which exposure to strong sunlight after eating the plants mentioned results in the blistering of the white skin of an animal. This should not stop anyone from growing alsike clover and buckwheat, but discretion should be used in pasturing animals with white skin.

Photosensitization is not common, but it does occur. A Hereford heifer was presented to the Alberta Veterinary Laboratory in 1950 in serious condition due to photosensitization. In this case most of the skin on the white surface was blistered.

Dermatitis

Horses grazing in alsike clover, wet with dew, followed by exposure to bright sunlight, may develop a blistering on the white skin areas, usually nose, face or pasterns.

Young white pigs in alsike clover or rape which is wet with dew may develop severe blistering, with cracking of the skin. White pigs should not be permitted in high growing green forage if wet, during a period of bright sun. Night grazing will overcome this until the pigs are used to it.

Hydrocyanic or Prussic Acid Poisoning

Choke cherry, Pin cherry, Sorghum and Flax are plants that can cause this poisoning. In general, hydrocyanic acid develops only when the normal growth of the plants has been retarded or stopped by drought, frost, bruising, trampling, wilting and other causes.

Mature plants contain a smaller percentage of potential acid than do the young plants. Plants grown in poor soil contain less than those grown

in good soil. Well cured fodder will contain little or no acid. With flax the immature seed-pods are the most dangerous. With choke cherry, the wilted leaves are most likely to contain hydrocyanic acid.

When plants containing cyanide are grazed, symptoms may appear within 10 to 15 minutes after the animals reach the field and deaths may occur within a few minutes. Drowsiness, watering of the eyes, twitching of the muscles, frothing, staggering, inability to stand and difficult breathing are the symptoms. Intravenous treatment by a veterinarian is the most satisfactory if given in time. For cattle, $\frac{1}{2}$ to 1 dram of potassium permanganate in solution, given as a drench, will destroy the unabsorbed hydrocyanic acid.

The blood in veins of animals dead of hydrocyanic poisoning maintains the arterial condition and is bright red. This is an important diagnostic fact.

Poisonous Seeds

The ripened seeds of the mustard family are the worst if taken in quantity by swine, sheep or cattle. Cow and corn cockle seed at the rate of $\frac{1}{4}$ pound per 100 pounds of body weight of an animal will usually cause death. These seeds are usually eaten in screenings. Consumption of mustard or cockle seeds causes irritation of the digestive tract, with vomiting, dizziness, diarrhoea and depressed breathing developing. Oily drenches are the best treatment.

Ergot

Ergot is developed among grasses grown on rich soil, in hot damp seasons. Rye is more susceptible to ergot than the other grasses.

Ergot may also affect red-top, oats, bluegrass, couch grass, rye-grass and other common grains or grasses.

On the plant, the ergot producing fungus manifests itself on the seed. Ergotized seeds are several times larger than the natural seed, hard, black and generally curved in shape.

The effect of the continued use of ergot in the feed is pretty well understood to be that of producing a degeneration and obstruction of the smaller arterial branches. The result is to shut off the blood supply to the parts of the body where the circulation is weakest, and thus produce mummification or dry gangrene of the extremities, as the ears, tail, feet. Cattle are the most susceptible to the influence of ergot.

Symptoms.—

Lameness in one or more limbs. Swelling around the ankle may occur and result in only a small slough or loss of a toe. It may, however, circumscribe the limb at any point below the knee or hock by an indented ring, below which the tissues become dead. The indentation in the skin soon changes to a crack, which extends completely around the limb, forming a line of separation between the dead and the living tissue. The crack deepens until the parts below drop off without the loss of blood and frequently

with very little pus. Ergot may cause serious irritation of the digestive tract or by acting on the nervous system it may cause sleepiness or paralysis. It also operates to cause contraction of the uterus and may thus cause abortion.

Treatment.—

Change the feed. Use local antiseptics. Tannin may be given internally in doses of one half dram, twice daily for a few days, to neutralize the unabsorbed alkaloids of the ergot. At the same time give castor oil. Bathe the affected parts with warm water. Consult your veterinarian for other treatment.

Plants that Occasionally Cause Poisoning

PLANT	SYMPTOMS
Horse Tail (dried) _____	loss of weight, staggering
Darnel (seed) _____	dizziness and convulsions (horses and sheep)
Lupines (seed-pods) _____	nervousness, labored breathing
Common Nightshade _____	paralysis, vomiting, diarrhoea
(unripe berries, leaves)	

WORTH NOTING

Two conditions due to poisonous plants that occur in the United States are reported here for the benefit of Alberta stockmen.

I. A Possible Sheep Killer

Halogeton, a native Siberian plant, has not yet been reported in Alberta although its presence has been noted in several of the western United States. By far the greater losses occur to sheep under usual conditions, but on occasion some loss to cattle may occur.

The poisonous properties of halogeton are due to an abundance of oxalate crystals, which often reach a concentration of 20 per cent of the dry weight of the plants. One and one-half pounds of green plant is considered a lethal dose for a mature sheep. The poison is not cumulative, and small quantities may be consumed day after day with no lasting ill effect. The only known symptom of the poison is a difficulty in breathing, and death is fairly rapid. Stock that are not receiving sufficient salt are more apt to eat quantities of halogeton, therefore, an adequate salt supply will likely prevent stock from over indulgence of the weed.

Halogeton (*Halogeton glomeratus*) is an annual plant that belongs to the Goosefoot family. It is related to Russian thistle which it closely resembles, particularly at flowering time. The leaves of both plants are rather fleshy, and round in cross section. Whereas the leaves of Russian thistle taper gradually to a sharp point, those of halogeton end abruptly and are tipped with a delicate spine. As the season advances the stems of Russian thistle take on a purplish colour, compared to the reddish colour of the stems of halogeton. Halogeton is a prolific seed producer, and at maturity the winged bracts on seeds almost entirely hide the leaves for the full length of the branches.

None of the present methods of weed control, either cultural or chemical, have been found practicable for control of halogeton. As the weed does not take hold on good native or seeded pasture land, any means that will maintain or improve the natural grass cover will help control losses. Prevention is still one of the best cures, and all stockmen would do well to learn what they can about this weed.

II. Big-head in Sheep

Big-head is caused by eating rabbit bush, a low spreading shrub that is unpalatable to livestock except sheep. Rabbit bush grows principally on very dry land. Two pounds per day for two days will kill sheep. In many cases it causes acute illness followed by swelling, soreness and irritation around the head, neck, ears, eyelids and nose, especially when the animal is exposed to sunlight. Some sheep may develop depression and weakness, and die within a few hours without swelling of the head region, if they have taken a large quantity of this plant.

FOR WEED IDENTIFICATION

Consult your District Agriculturist, or send the plant (root, stem, leaves and flower if possible) to the Field Crops Branch, Alberta Department of Agriculture, Edmonton.

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