Pine Needle Abortion in Range Beef Cattle

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FOR a number of years ranchers in range areas of the Province of British Columbia and the States of Washington, Idaho and Oregon have claimed that pine needles and pine buds were causing nutritional or mechanical abortion in range beef cattle. In British Columbia most claims centered in savannah-like range areas (Fig. 1) where the dominant pine is western yellow pine (*Pinus ponderosa* Laws). Such claims of pine needle abortion have been generally discounted since instances of brucellosis, phosphorous deficiency and vitamin A deficiency, each a cause of abortion are not unknown in these areas. In 1950 the B. C. Beef Growers Association requested that the Canada Range Experiment Station, Kamloops, B. C. undertake a study or series of studies to determine whether pine needles do or do not cause abortion in range beef cattle.

Review of Literature

Virtually no experimental work with pine needle abortion of beef cattle has been reported. Gunn, (1948) in writing on this problem in range herds stated, "Non-infectious abortion is not new to these areas and its possible cause is yet unknown. The best lead at present indicates that it rotates around errors in nutrition.—We are not prepared to admit that pine needles may play a part."

Figure 1. Pine Tree Reproduction Grazed by Range Beef Cattle

Muencher (1945) stated that a number of coniferous trees including pines may prove to be harmful when the leaves are browsed in large quantities or when they form an exclusive diet of stock. However, because of the resinous taste, animals seldom eat these plants unless they are driven to do so by lack of other forage. However Bruce (1927) reported that upon several occasions and from widely scattered sources he had been advised by responsible stockmen that cattle feed-

ing on needles of freshly fallen pine will abort.

Description of Plant

Western yellow pine, locally called bull pine, yellow pine, British Columbia pine or jack pine, grows to heights of 160 to 170 feet or more under favourable conditions. Ordinarily under range conditions it attains a height of 70 to 80 feet, branches are usually fairly short, stiff, and upturned. Western yellow pine is peculiar in having its needle-like leaves in bundles of 2 to 5, 3 being the more common. These needles are from 7 to 11 inches long and dark yellow-green in colour (Henry, 1915).

In Canada this tree is confined to the drier portions of the southern interior of British Columbia (Fig. 2), extending as far north as Vavenby on the North Thompson River (Canada 1950), Clinton and the Caribou Road, and eastward from the Cascade mountains (Henry, 1915).

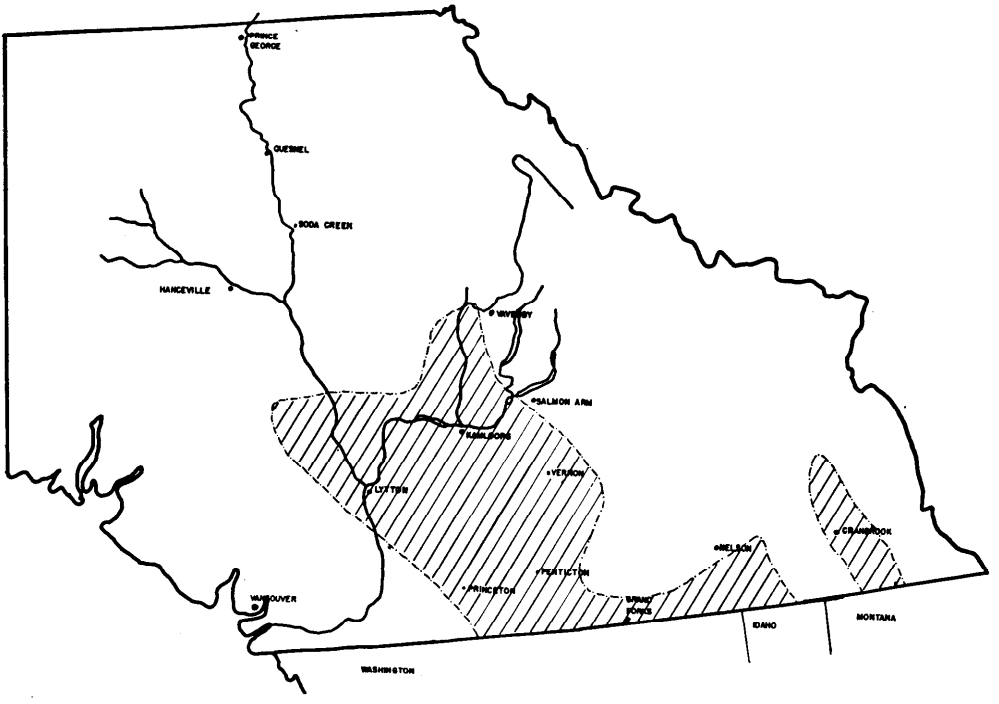

Figure 2. Distribution of Western Yellow Pine in British Columbia

Experimental Procedure

During the 1950 fall round-up 18 Bang's disease free pregnant range cows of Hereford breeding were selected, weighed and divided into three comparable groups. The animals were housed in groups in an open faced stock shed. Shavings were used for bedding and provided as required. Care was taken in arranging the pens and exercise yards to eliminate factors capable of producing mechanical abortion. Unheated water was available in troughs approximately 800 feet away from the feed racks and mineral boxes.

Each group was fed once daily. Hay was fed in racks; the pine needles and oilcake meal were fed in grain troughs. Pine needles and buds were collected fresh daily by stripping them from standing living pine trees.

In group I pine needles and buds were fed at a rate of 5 pounds per head per day and gradually increased until at the completion of the trial animals were receiving 8 pounds. The proportion of crested wheatgrass hay was reduced from 15 pounds per head per day according to the weight increase in pine needles fed over 5 pounds. In group II animals were allowed free access to pine needles with no compensatory reduction in cultivated roughage. These fresh needles were placed in the trough daily. Group III animals were refused pine needles. After the 42nd day 5 pounds of alfalfa hay was fed in replacement for an equal weight of crested wheatgrass hay in all groups. A mineral mixture was available to each group at all times. It was made up of ingredients in the following proportions: bonemeal, 50 pounds; salt, 50 pounds; iron sulphate, 4 ounces; cobalt sulphate, 0.8 ounce; manganese sulphate, 0.5 ounce; copper sulphate 0.3 ounce; potassium iodide 0.3 ounce.

A vitamin A supplement in the form of pitchardine oil, was provided daily to all animals at the rate of 3000 I.U. per 100 pounds live weight. This was mixed with the oilcake meal and fed immediately.

Hay and concentrate samples were taken for chemical analysis immediately prior to the commencement of the trial and at the approximate mid point of the wintering period. Pine needles and bud samples were analyzed immediately prior to the commencement of the trial and at six week intervals throughout the experimental period. The samples were analyzed at the Nutrition Laboratory, Canada Experimental Station, Lethbridge, Alberta for the following constituents: Crude protein, Ether extract; Crude fibre, Ash, Moisture, Nitrogen-free extract, and Carotene.

Each animal was weighed individually after being on trial 28 days. Being range cows, it was very difficult to weigh without exciting them. Weighings were discontinued at this point to eliminate the possibility of mechanical abortions induced during weighing operations.

Daily feed records were kept and the conditions of the animals noted. Mineral consumption was computed every 14 days. The conditions, number and weight of calves born normally or aborted was carefully noted.

Results and Discussion

In weighing the experimental cows after the first 28 day wintering period it was noted that each group recorded gains in weight as did each animal within the groups. Cows in group I started the trial with an initial average weight of 947 pounds and recorded a gain of 65 pounds per head at the completion of the first 28 day feeding period. Cows in group II started at 937 pounds and gained on the average 133 pounds while during the same 28 day period. Group III cows averaged 46 pounds gain from an initial weight of 937 pounds. While no further weights were recorded because of the temperament of the range cows, ocular appraisals indicated that the cows continued to rise in conditions and general appearance until parturition. A summary of the rations fed by groups is given in Table 1.

In comparing this ration (assuming 50 percent digestibility) with allowances recommended by Morrison (1945, Table III, p. 1006), and the National Research Council (Guilbert, *et al*, 1945), we find that it is adequate according to Morrison's standard but fails to reach the standard recommended by the Research Council. However, judging from the gains in weight and conditions shown by the animals during the trial it is assumed that an adequate ration was supplied.

One cow in the control group appeared

listless and a poor feeder: After one month on trial she was culled from the experiment and returned to the general herd. Within the herd she calved normally at the proper time.

All cows were bred to commence calving on March 15th, which is the general practice in the Kamloops district. With the exception of the first 3 cows general symptoms of parturition were evident for a normal period of time. Calving commenced on February 6 and continued until May 17 when the last cow in group I calved. The experiment was discontinued on May 7 in order that the experimental animals could be returned to the main herd. The results by groups are given in Table 2.

In summary, group 1 cows produced 3 calves born dead, 1 calf born alive and died later, 1 calf born alive but weak and small, and 2 normal calves (1 after turnout). Group II cows produced 1 calf born dead, 4 calves born alive and died later and 1 normal calf. Group III cows produced 5 normal calves. It is interesting to note that 7 cows calved before the first control calf was dropped.

TABLE 1
Nutrients fed per head per day

FEEDSTUFF	AMOUNT	POUNDS OF NUTRIENTS CONSUMED				
		Crude protein*	Ether extract	Crude fibre	N.F.E.	T.D.N.†
Group I. Pine Needles						
	lbs.					
Pine needles	6.40	0.393	0.536	1.470	1.459	2.088
Crested wheat-grass hay	10.50	0.641	0.251	3.509	4.584	4.504
Alfalfa hay	3.10	0.376	0.063	1.162	0.894	1.296
Oilcake meal	0.50	0.167	0.030	0.045	0.198	0.254
Total	20.50	1.577	0.880	6.186	7.135	8.142
Group II. Free Access						
Pine needles	4.99	0.302	0.409	1.114	1.259	1.690
Crested wheat-grass hay	16.87	1.048	0.390	5.548	7.120	7.301
Alfalfa hay	3.13	0.376	0.063	1.162	0.894	1.296
Oilcake meal	0.50	0.167	0.030	0.045	0.198	0.254
Total	25.49	1.893	0.892	7.869	9.471	10.541
Group III. Control						
Pine needles	0.00	0.000	0.000	0.000	0.000	0.000
Crested wheat-grass hay	16.87	1.048	0.390	5.548	7.120	7.301
Alfalfa hay	3.13	0.376	0.063	1.162	0.894	1.296
Oilcake meal	0.50	0.167	0.030	0.045	0.198	0.254
Total	20.50	1.591	0.483	6.755	8.212	8.851

* Crude Protein = Nitrogen × 6.25 (Jones, 1931).
† T.D.N.—computed assuming 50% digestibility.

While the experimental numbers are small an analysis of these data indicate statistically significant increase in frequency of abortions and stillbirths due to the effect of eating pine needles and buds and it is concluded that they are agents causing abortion in range beef cattle. This finding is confirmation of the opinions and beliefs of many stockmen throughout the range areas of British Columbia and adjoining states to the south.

In view of this information it is suggested that the bred cow herd be wintered on areas free of western yellow pine. If this is impossible the lower branches of these trees should be pruned. Logging operations should be discontinued in the presence of bred cows since cows will nibble on the slash even though adequately fed.

Conclusion

1. Pine needles and buds are a causative agent of abortion and the birth of weak calves.

2. Pregnant range cows will consume quantities of needles and buds even though adequately fed.

3. Pine needles and buds are palatable to wintering stock.

4. Bred range cows should be wintered in areas where such feed is inaccessible.

5. Forestry operations to cut western yellow pine should be suspended during times when bred cows are present.

TABLE 2

Calving record of experimental animals

DATES	GROUP			COMMENTS
	I Pine needles	II Free access	III Control	
February				
6	Bull			Born premature and dead
8		Heifer		Born premature and dead
March				
1	Twins, Bull & Heifer			Born premature and dead
2		Bull		Born premature & alive—died March 4
6		Heifer		Born premature & alive—died March 7
12	Bull			Born alive, died shortly after birth
17		Heifer		Born alive, weak, died in 36 hours
21			Heifer	Born alive, normal, weight 70 pounds
27			Heifer	Born alive, normal, weight 70 pounds
27	Heifer			Born alive, normal, weight 65 pounds
28		Heifer		Born alive, appeared normal, died in 18 hrs.
April				
7			Bull	Born alive, normal, weight 75 pounds
24	Heifer			Born alive, weak, weight 45 pounds
25		Bull		Born alive, normal, weight 60 pounds
27			Bull	Born alive, normal, weight 78 pounds
28			Bull	Born alive, normal, weight 70 pounds
May				
7				Cattle turned out
17	Heifer			Born alive, normal—after turn out.

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A publication is not judged by its length but by the message it carries. . . . Verbosity and diffuseness suggest a possible lack of really important matter to fill out the space, or at least that the writer has not digested what he has to say.—*E. W. Allen.*

A good rule is never to use two pages for a subject that can be compressed by a little thinking into one.—*E. F. Smith.*

Winston Churchill in demanding that his cabinet ministers confine their reports on the most momentous matters to a single page, said: "It is sheer laziness not compressing thought into a reasonable space."