

tained a germination of over 80 percent until 6 years after harvest, fell to 47.1 percent 10 years after harvest and were entirely dead by 14 years after harvest. Abstracted from "Germination of 20-year-old wheat, oats, bar-

ley, rye, sorghum, and soybeans" by D. W. Robertson, A. M. Lute, and H. Kroeger, in *Journal of American Society of Agronomy*. 35:786-795, 1943.

(Abstracted by H. L. Walster)

## Use of Screenings for Feed

By

O. A. STEVENS, Associate Botanist

**WEED SEEDS AND MATERIAL** other than grain in screenings may have considerable value as feed for livestock, or they may be poor or actually injurious, depending upon the nature of the material. Mustards in general are undesirable and likely to be injurious if present in considerable quantity. Ergot, a diseased condition of grain found mainly in rye, but sometimes common in wheat, is likely to cause serious illness if it is present in excess of 1 or 2 percent.

Weed seeds are as diverse in character as are wheat, flax and castor beans. Some are readily utilized, others only with difficulty. Feeding trials with sheep at the experiment station in 1923-25 showed that wild oats of good weight were about equal in value to common oats, and that pigeon grass seed could be substituted for barley up to two-fifths of the total of the concentrate ration, without decreasing the gain in weight of the animals.

But quality of weed seeds is even more variable than that of cultivated crops. Wild oats and pigeon grass both shatter readily at maturity. Much of the seed of these plants which is threshed with the grain was immature at time of cutting, therefore, is light in weight, has a high proportion of hull and

low feed value. The actual grain of wild buckwheat is similar in composition to that of wheat but it has a thick, hard shell, and much seed as threshed is light in weight. Wild oats, pigeon grass and wild buckwheat often make up the larger part of grain screenings. Ground kinghead seed appeared somewhat unpalatable but when fed as two-fifths of the concentrate ration, it seemed nearly as valuable as barley. Some chemical analyses showing the composition of common weed seeds are given in the following table.

In order that the reader may be able to compare the chemical composition of these grass and weed seeds with the chemical composition of common grains the following data showing the composition of wheat, oats, and

## Chemical composition of grass and weed seeds

Quality	Lbs. per bu.	Crude			Crude fiber	Nitrogen- free extract	
		Ash	protein (Nx6.25)	Ether extract			
		%	%	%	%	%	
Western wheatgrass	32% chaff	14	7.91	8.76	3.53	20.58	49.22
Pigweed <sup>1</sup>	good, clean, mature	64	3.25	16.82	6.24	15.85	47.84
Kinghead	plump, heavy seed	37	2.87	16.44	16.83	39.17	14.69
Kinghead	immature & empty	24	3.62	17.33	11.99	37.65	19.41
Wild Oats	near best quality	9	5.55	13.73	5.74	16.74	48.24
Lambsquarters	clean, mature	56	3.23	17.14	8.47	19.87	41.29
Lambsquarters	calyces <sup>2</sup> and im- mature only	11	13.16	22.90	1.63	11.33	40.98
Lambsquarters	variable maturity	15	12.27	21.64	3.52	14.26	38.31
Wild buckwheat	mature, calyces <sup>2</sup> present	36	3.19	13.22	2.44	9.27	61.88
Wild buckwheat	less mature	25	3.30	13.29	1.83	11.19	60.39
Smartweed <sup>3</sup>	mature	52	1.88	9.61	3.58	21.23	53.71
Yellow pigeongrass	mature (July)	39	6.57	12.96	7.50	20.50	42.47
Yellow pigeongrass	mature (August)	39	6.34	13.20	7.63	21.16	41.67
Yellow pigeongrass	immature	27	7.14	12.28	6.17	24.30	40.11
Green pigeongrass	mature (August)	46	5.66	15.43	5.34	12.27	51.30
Green pigeongrass	mature (Sept.)	46	5.25	16.47	5.72	12.68	49.88
Green pigeongrass	immature	36	6.33	15.74	5.03	13.42	49.48

The above analyses were made by T. H. Hopper formerly Agricultural Chemist of this Station, from hand collected seed of 1933 crop, and are calculated to 10 percent moisture basis. The seeds were thoroughly hand cleaned to heavy quality except as otherwise indicated. The low bushel weight of the wild oats is due to the fact that this was hand collected seed, the awns all present and the material therefore very loose. The grains were mature and were hand picked for plump seed.

barley are added. The data are (1923) but are re-calculated to a taken from the 18th edition of Morrison's Feeds and Feeding basis.

## Chemical Composition of wheat, oats, and barley grains.

(From Morrison's Feeds and Feeding.)

	Ash	Crude Protein	Ether Extract	Crude Fiber	Nitrogen-free extract
	%	%	%	%	%
Wheat .....	1.90	12.43	2.10	2.20	71.26
Oats .....	3.47	12.29	4.36	10.80	59.07
Barley .....	2.68	11.41	2.09	4.56	69.26

North Dakota grown small grains, especially wheat, will average higher in crude protein, wheat about 14 percent and oats and barley proportionately high-

er; their nitrogen-free extract content will be correspondingly reduced. By nitrogen free extract is meant, in general, the starches and sugars in the seeds;

<sup>1</sup>Pigweed—*Amaranthus retroflexus*.

<sup>2</sup>Calyces, plural of calyx. The calyx is made up of the sepals, an outer row of leaves, or leaf-like parts making up the outermost part of a flower.

<sup>3</sup>Smartweed—*Polygonum lapathifolium*.



Catchfly



Pink cockle



Lambsquarters



Frenchweed



Hare's-ear mustard



Common mustard



Tumbling mustard



Pigweed

These common weed seeds are not readily utilized in feed and are likely to be injurious if present in any quantity. The best way to dispose of them is to screen out and burn them.

by ether extract is meant, in general, the fats and oils in the seeds.

Small, black seeds, not larger than a pin head, frequently comprise a considerable bulk of screenings. These are usually lambsquarters, sometimes pigweed or other seeds. In general, the small seeds are likely not to be utilized as feed, except by sheep. Even when screenings are ground, many of these hard black seeds are not broken up. We have commonly recommended that if screenings are to be used for feed, these small seeds should first be cleaned out and burned. If material containing them is fed, most of these weed seeds will be left in the manure. Such manure should be thoroughly composted to kill the weed seeds before it is spread on fields.

Some weed seeds may be injurious. Occasional cases are reported where the use of screenings has been suspected to have been the cause of illness or loss of livestock. It has not been possible to establish screenings as

the cause in these cases, but frequently screenings contain a large amount of mustards which would at least be unsafe to use for feed.

Recently, a sample was received with an inquiry about its availability for feed. This was analyzed for kinds of seeds and will illustrate some things about the diverse nature of such material.

Chaff .....	30 percent
Grain, mostly wheat	41
Mustards .....	16
Lambsquarters .....	8
Other weed seeds .....	5

In this case, the mustard was mostly hare's-ear mustard. If the material were screened to remove the undesirable mustards, nearly one-half of the grain (broken wheat) would also be removed. The amount of time required to make such an analysis is too large for the Experiment Station to carry out except in special cases.

Chemical analysis is also not practical. It would require much time and in some cases, would show apparently high

values, as in the case of mustards or other seeds which cannot be utilized. Mustards, for example, contain irritating oils which make them undesirable. Some seeds are very unpalatable and this is not shown by chemical analysis. A further difficulty for either sort of analysis, is that of securing a representative sample.

Another sample analyzed a few years ago contained:

Wild buckwheat	.....40.2 percent
Broken wheat	.....30.0
Mustard	..... 3.8
Other weed seeds	....22.0
Chaff	..... 3.8

This sample should be relatively high in value because the mustard seed content is low, with wheat and wild buckwheat making up the 70 percent of the total weight. Still another sample contained the following:

Wild buckwheat	.....35.4
Hare's-ear mustard	.....13.1
Frenchweed	.....12.1
Wheat	..... 6.6
Lambsquarters	..... 9.9
Green pigeongrass	..... 9.4
Wild Oats	..... 4.1
Other weed seeds	..... .8
Chaff	..... 8.6

This, again, would be undesirable because of the large amounts of Frenchweed and hare's-ear mustard. As will be noted, it also had very little grain in it.

Weight is usually a good index of value, especially when such seeds as wild oats, pigeon grass and wild buckwheat are concerned. It may be pointed out, however, that pigweed seed is especially heavy. We found that mature, clean pigweed seed weighed as much as the best

wheat. The seeds of lambsquarters are retained in the flower parts unless these are rubbed off, but pigweed seeds always shatter out easily.

An estimate of the composition of a sample of screenings could best be made by fanning out the chaff—the old fashioned winnowing by pouring from one pan to another in a light wind is sufficient—and running it over about a 10-mesh screen to remove small seeds. This will show the amount and nature of the small, undesirable seeds.

Some materials in screenings occasionally have commercial value for other purposes. Ergot is a standard source of drug materials and when any quantity of suitable quality occurs, it will be worthwhile to re-clean it from the screenings for sale for this purpose. A sample should first be submitted to a wholesale drug firm for an estimate on its value.

Mustard seed has market value but only for certain kinds and screenings usually contain a mixture of different kinds. The one which occurs in North Dakota which is chiefly in demand is Indian Mustard (*Brassica juncea*). This is a round, but slightly irregular, reddish-brown seed, which shows a fine network of raised lines when examined with a magnifying glass. Seeds of charlock, also called "Common, Field or Yellow" mustard (*Brassica arvensis*) are more evenly rounded, smooth and black, unless immature, when they are red. This is not in demand and the two are usually mixed together in screenings.