

Palatability Trials  
of Winter Pasture Crops,  
and  
Effect of Phosphate Fertilizers  
on Palatability

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# Palatability Trials of Winter Pasture Crops, and Effect of Phosphate Fertilizers on Palatability

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It is often said that livestock will not eat certain forage crops, or that one crop is more palatable than another; but there is little research evidence to support such statements.

Any research attempting to compare directly the palatability of two or more crops encounters many difficulties, some of which are illustrated later in this report. Before any definite conclusions are made about relative palatability, it is necessary to be sure data are comparable and that observations were accurately made and interpreted.

As part of a general research program on temporary winter pasture,\* the Oklahoma Station in the fall of 1943 set up a project designed to determine, if possible, the relative palatability of winter pasture crops commonly grown in this State.

## **Plan of the Experiment**

The varieties and crops used were Tenmarq hard wheat (C.I. 6936), Clarkan soft wheat (C.I. 8858), Balbo rye, Michigan Winter barley (C.I. 2036), Winter Fulghum oats (C.I. 2500), and annual ryegrass (*Lolium multiflorum*). The pasture area was upland soil of medium fertility but very low in phosphorus. It was divided into twelve rectangular fields or plots each 48 feet wide and 150 feet long, as shown in Figure 1.

Each plot included approximately 1/6 of an acre. Plots were arranged so that every duplication was the same distance from each other. All crops were planted in early September of 1943 and 1944. When the crops had made a satisfactory growth, six dairy cows (two Holsteins, two Jerseys and two Guernseys) were selected for the grazing trial. The cows were all mature, large, and from all appearances good grazers.

\* The research reported here is one phase of a more extensive project on the forage yield and nutrient content of various winter pasture crops.

When to turn in the cows was the first difficulty encountered. Regardless of how much care was used in preparing the seedbed, in seeding, and in providing ideal growing conditions, the crops would not develop alike. The barley and rye grew off rapidly and were ready to graze several days before wheat, oats or ryegrass, and ryegrass was very slow to start. After it was decided that ryegrass would never make a good fall pasture, the cows were turned in for the trial.

All the cows were turned loose at different points down the center alley about 8:30 o'clock each morning and each cow was allowed to graze free-choice until she got her fill. This took about 1½ to 2 hours, depending on the availability of forage. The cows were then removed from the field. The same process was repeated in the afternoon. Each cow was carefully clocked from one plot to another. The number of minutes she spent on each plot was recorded, so that her day's grazing activities could be tabulated. The plots were grazed in this manner throughout the fall and spring months.

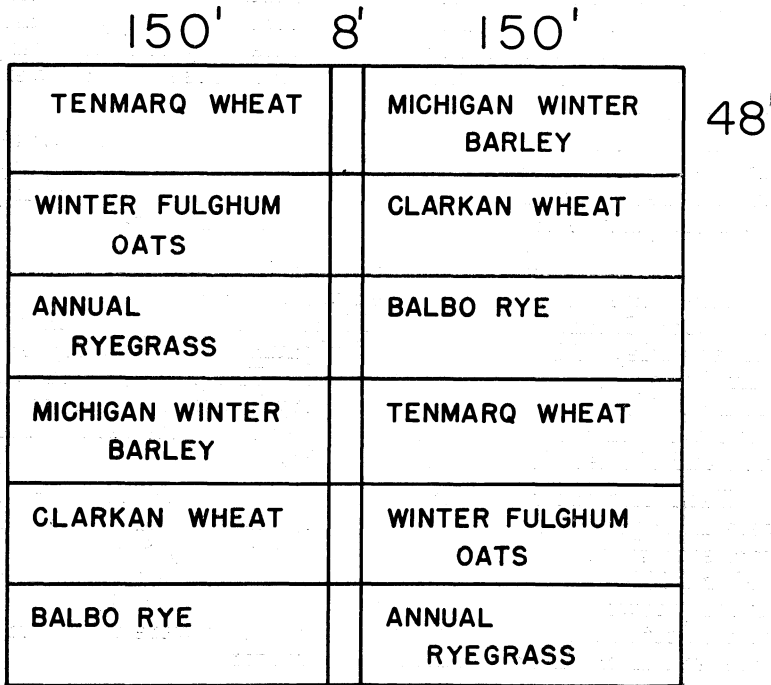


Fig. I. PALATABILITY TRIAL PLOTS.

No commercial fertilizers were used on any of the plots the first year. Just before seeding the second year, 150 pounds of 20 percent superphosphate was applied to the east half of the field, thus allowing for a varietal and fertility palatability trial.

### Results and Discussion

Tables I and II show the number of minutes the cows spent grazing each crop during the two seasons. These figures, however, do not tell the whole story, and in some cases may be actually misleading. There is always some question as to whether grazing time was related to availability of the forage rather than to its palatability. Furthermore, there were indications that the cows, like humans, had individual preferences. The detailed data show that the variation among animals during the season and at any given time of grazing is at least as great as the average variation among crops. Some cows would not eat ryegrass, others seemed to prefer soft wheat, and still others apparently liked oats so well that they grazed the oat plots as long as any green forage was available.

#### 1943-44 Season

Although Table I shows the cows spending nearly twice as much time on barley as they did on any other crop, the reason may have been one of availability rather than palatability. In the fall season, barley and rye were ready to graze before the ryegrass. When the cows were turned in they spent most of their time on the crops which were ready. By the time the barley and rye were grazed down, the crops which developed more slowly were ready for grazing. The total amount of forage produced by any one crop was somewhat limited.

In the spring, rye and barley grew off rapidly and were ready to graze ahead of the wheat, oats and ryegrass. This raised a problem of procedure: Should the cows be kept out until all crops were ready, or allowed to graze each crop as it became ready? The first plan was chosen; but in a few days barley and rye became tough and stemmy, and by that time wheat and oats were in fine condition for grazing. Ryegrass came along nicely later, but the cows continued to prefer the wheat. Soft wheat was favored because it stayed in good grazing condition longer while the cows were on the pasture. The total figure would no doubt have been in favor of barley and rye if the cows had been allowed to start grazing two weeks earlier.

The only definite conclusion one can draw here is: Ryegrass was in nice grazing condition for a much longer period than any other crop, but the cows did not spend much time grazing it.

**TABLE I. — Grazing Time on Equally Accessible Crops; Totals for Six Cows; 1943-44 Season.**

Crops and Variety	Total Minutes Spent by Cows on Each Crop		
	Fall	Spring	Total
Rye; Balbo	680	998	1,678
Oats; Winter Fulghum	610	1,127	1,727
Barley; Michigan Winter	915	1,005	1,920
Wheat; Tenmarq (hard)	576	1,418	1,994
Ryegrass; Annual	644	645	1,289
Wheat; Clarkan	675	1,820	2,495
<b>Total</b>	<b>41,000</b>	<b>7,013</b>	<b>11,113</b>

**TABLE II. — Grazing Time on Equally Accessible Crops, Fertilized\* and Unfertilized; Totals for Six Cows; 1944-45 Season.**

Crop and Variety	Grazing Time (Minutes)			
	Unfertilized	Fertilized	Total	Advantage for Fertilized Plots**
Hard Wheat; Tenmarq	410	829	1,239	419
Soft Wheat; Clarkan	815	1,839	2,654	1,024
Rye; Balbo	1,336	1,656	2,992	320
Barley; Michigan Winter	1,835	3,183	5,018	1,348
Oats; Winter Fulghum	1,264	1,379	2,643	115
Ryegrass; Annual	620	811	1,431	191
<b>Total</b>	<b>6,280</b>	<b>9,637</b>	<b>15,977</b>	<b>3,417</b>

\* 150 lbs. of 20% superphosphate per acre.

\*\* Fertilized minus unfertilized.



In general, the results suggest that these crops cannot be made to grow so they can be tested side by side and in comparable condition.

### 1944-45 Season

#### General Results

Similar difficulty in making accurate comparisons was encountered in 1944-45. If the total figure is the true story, barley was the most palatable (Table II). But during the fall the wheat was rusty and the cows did not graze it, while the ryegrass was slow and was hardly ready before cold weather.

Oats, barley and rye were growing nicely and were about the same height when the cows were turned on in the fall. The cows appeared to definitely prefer the oats. They stayed on the oat plots until the forage on those plots was all consumed, then started on the rye and grazed it down. By the time the cows got to the barley it had had 10 to 12 days growing advantage and they spent much more time on it because it was plentiful and was about all they had to graze. From this, it appears that oats was preferred, followed by rye and barley.

The following spring, all the crops except rye were in good condition and about the same height. Rye was 8 to 10 inches tall and the other crops 3 to 5 inches. The rye was ready to graze two to three weeks before the other crops, but the cows were kept off until all crops reached grazing height. The rye would undoubtedly have been grazed more had it been grazed sooner. As in the fall, the cows again spent more time on the barley plots than on any of the others, apparently because barley was in good condition and had lots of green, palatable forage at the proper time.

#### Fertilized vs. Unfertilized

The fertilized plots were preferred by the cows in every instance (Table II), although the difference was not great in the cases of ryegrass and oats. Whether the difference was due to the availability of the forage or to its palatability remains a question.

To check on availability of forage at the time grazing started, the forage from a one-square-rod sample area in each plot was cut and weighed, both fall and spring. Weights are shown in Table III. The phosphated plots had more forage than the unfertilized ones, especially during the fall season.

On the palatability side, it was obvious throughout the season that forage on the fertilized plots had a better color and a higher moisture content.

### Conclusions

For any of the crops tested, availability of forage is an important point, and perhaps more important than palatability.

It is difficult if not impossible to measure the relative palatability of several pasture crops, because of (1) variability in growth habits of the crops and (2) what appear to be individual preferences of specific animals.

When temporary pasture crops are grown on low-phosphate soil, animals show a preference for the forage on phosphated plots as compared to that on unphosphated plots; but whether this preference is due to palatability or to availability remains a question.

**TABLE III. — Forage Available on Fertilized and Unfertilized Plots Before Grazing Started; Fall 1944 and Spring 1945.**

Crop	UNFERTILIZED			FERTILIZED*		
	Weight of Forage per Acre (Lbs.)			Weight of Forage per Acre (Lbs.)		
	Green	Dry**	Percent Moisture	Green	Dry**	Percent Moisture
<b>November 16, 1944</b>						
Hard wheat	998.5	309.5	75.2	1510.3	483.3	74.4
Soft wheat	1123.6	356.8	74.6	2037.8	573.1	74.5
Barley	2439.4	652.5	78.6	3775.2	953.2	79.8
Oats	2730.6	750.9	78.0	2212.1	616.2	77.7
Rye	3390.2	970.4	77.1	3823.6	1027.8	78.5
Ryegrass	1036.1	265.5	79.5	1667.8	381.5	81.7
<b>March 28, 1945</b>						
Hard wheat	2571	690.8	78.5	2852	689.9	79.2
Soft wheat	3142	828.6	78.9	3809	1004.5	78.9
Barley	1933	514.6	78.7	2455	638.2	79.2
Oats	1157	319.0	77.9	1276	354.0	77.8
Rye	5065	1354.9	78.6	5162	1386.2	78.5
Ryegrass	2300	569.6	80.1	1950	482.6	80.2

\* 150 pounds of superphosphate per acre.

\*\* Corrected for 20% moisture hay.