

Oklahoma  
Agricultural  
Experiment  
Station.

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BULLETIN NO. 6, MAY, 1893.

Notes of Progress---Analyses.

STILLWATER, OKLA.

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OKLAHOMA  
EXPERIMENT STATION,

STILLWATER, OKLAHOMA.

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BULLETIN NO. 6.

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NOTES OF PROGRESS,

—BY—

J. C. NEAL, DIRECTOR.

A very casual study of the situation is convincing that one of the most pressing needs of Oklahoma is a series of good grasses.

A good lawn grass, several grasses for pasture, and several for forage are loudly called for, and this demand cannot be neglected by the Exp. Station. No one doubts but that the native prairie grasses are thoroughly adapted to the conditions of this soil and climate. They have survived through ages of storms, winds, hail, drouths and floods. They are tough fibred, long rooted, vigorous, weedy. On the protected and fertile bottom lands the Blue stems and Blue joints (*Agropyrum*) have developed into almost tropical forms, while in the sterile alkali flats the humble Bunch grasses (*Boutelouas*) make almost as dainty a growth as the favored grasses of Ireland. With all our wild grasses it has been a long fight for life, and they have adapted themselves

fairly well to their rigorous environment. But the growth is usually tufty, there are few if any sod grasses, or winter pasture grasses. However, in the past, this native herbage gave a scanty food for the Buffalo and Deer, while there were thousands of acres in the range, now it is quite inadequate for the feeding of our stock. We must find something better, something that will give more tons to the acre, and more food to the ton. As this fair land is henceforth to be the home of civilized people, with improved cattle, sheep and hogs, we must find grasses that will best aid the new order of things. Accordingly, the Oklahoma Experiment Station, in the future will devote no inconsiderable part of its time and area to the solution of this problem.

The last year has been very trying upon the plats sown in the beginning of this series of experiments, yet the results, though not conclusive are very gratifying, and give some hope that a start has been made that will lead to something more valuable.

The grasses in the experimental plats that have survived, did so under the most discouraging circumstances. The soil was far below the average in quality of second class upland, the plats were on a hillside, and several were strongly alkaline. Last summer was extremely hot and dry, and the winter the coldest known for many years, with a large number of days below the frost point and the grasses exposed to the wind unprotected by snow or shade.

As it is only the intention at this time to present notes of progress in the experiments at the Station, we will not give extensive comments, reserving them to a future date, when we can be more certain of results.

All the grasses named were sown during the first week in March, a date we now think generally unsuitable, as about that time it is usually dry, windy and cold.

The notes apply to observations made May 5, to 10, 1893.

ANTHOXANTHUM ODORATUM, SWEET VERNAL GRASS.

This fragrant grass stood the heat and drouth poorly, but seemed to revive with the approach of cold weather, and began blooming the first of May. It is now one foot high, well stooled, vigorous growth, foliage yellowish green.

AGROSTIS CANINA, BENT OR DOG GRASS.

This has shown remarkable vigor, standing both heat and cold, and covers the plat well, is six inches in height, foliage yellowish green, and bids fair to be a good grass for this section.

AGROSTIS STOLONIFERA, CREEPING BENT GRASS.

This was badly injured by the heat, unaffected by the cold, is now in full bloom, one foot high, with dark blue green foliage.

AGROSTIS VULGARIS, RED TOP GRASS.

This favorite grass of the eastern states made a poor growth during the heat of last summer, and suffered badly from the two periods of drouth. In the fall it seemed to recover a little, and now presents a fair stand, is six inches in height, and the foliage is dark blue green. Planted at another time, no doubt it will do much better.

AVENA ELATIOR, TALL MEADOW OAT GRASS.

This did only fairly during the heat, but rallied in the winter, and has made a good growth, is in full

bloom, is 15 inches in height, foliage blue green.

AVENA FLAVESCENS, YELLOW OAT GRASS.

This has a poor stand, as it suffered severely from the drouth, is now in bloom, one foot high, yellowish green foliage.

BROMUS INERMIS, AWNLESS BROME GRASS.

This fine grass endured the heat and cold as well as the native grasses, has a good stand, is six inches high, and is, so far, an apparent success.

BROMUS SCHRAEDERI, SCHRAEDER'S GRASS.

This made nearly a failure, as it was badly hurt by the heat.

CYNODON DACTYLON, BERMUDA GRASS.

Until frost, this grass made a fine growth, and on poor land covered the plat with a beautiful sod. The cold affected it very badly, and it is just now showing some signs of life for the first. Alone, in this climate, it evidently is not suitable as a pasture or lawn grass, but may do better if planted with another grass of more hardiness, that may serve to protect it.

DACTYLUS GLOMERATA, ORCHARD GRASS.

Beginning now to bloom, poor stand, does not endure the heat well, but might do better if planted thickly, and at another time than in March. Probably needs sowing with another grass.

FESTUCA GRASSES.

These are beautiful, fine leafed grasses, but are evidently too tender for the rough winds and drouths of this section.

Of the four varieties tried, the "ovina tenue" seemed

to do the best, though none are of much value, judging from the last year's experience.

LOLIUM ITALICUM, ITALIAN RYE GRASS.

This was nearly a failure from the drouth.

LOLIUM PERENNE, PERENNIAL RYE GRASS.

This is a marked contrast to the last plat. The stand is extremely good, the ground finely covered, the foliage a rich blue green. In full bloom. This seems very promising.

PENICILLARIA SPICATA, PEARL MILLET.

This made a fair growth, averaging 4 feet, and gave an enormous amount of green forage. It grew on an alkali spot, but did not seem to be discouraged as most plants are. It is worthy of an extended trial.

PHLEUM PRATENSE, TIMOTHY.

This fared very poorly, and is nearly a failure, though the cold seemed to bring it out a little. Mixed with other grasses to protect it from the sun, it may do better, and needs futher trial before rejection.

POA ARACHNIFERA, TEXAS BLUE GRASS.

This proves to be a superior grass, and as it is a native and quite common everywhere, it can be recommended. It endured the heat and cold, is now in full bloom and comes the nearest to a sod grass of any of the native grasses that we have.

The cottony seeds are hard to plant, but the sets can readily be obtained, and for small areas would soon form a sod for lawn if planted in rows with a small quantity of fertilizer as a stimulant to rapid growth.

POA PRATENSIS, BLUE GRASS.

It was too late in the season last year to get a good



stand of this fine grass, but in this neighborhood, it has done well, after two years of trial.

Where it has considerable shade it has done best.

POA SEROTINA, FOWL MEADOW GRASS.

This developed into a fine, thrifty pasture grass that made a very satisfactory growth all the time. It is now six inches high, the foliage is dense and a bright blue green.

POA TRIVIALIS.

Of no value on dry soil, as it burned out badly.

PASPALUM PLATYCAULE. LOUISIANA GRASS.

This made a fine growth during the summer, defying the heat, but the frost killed it, root and branch.

ORYZA SATIVA, JAPAN RICE.

This succumbed early to the drouth, but the growth would indicate that in damp low lands it would do very well.

All the Lentils died during the protracted drouth in the summer.

The Lupines fared badly at the start, from the attacks of the black potato bug and the grasshoppers, and proved of no value, as they could not endure the heat.

The seeds of the Teosinte failed to germinate, but this year we have a fine stand, and this forage plant may yet prove to be a good thing.

LATHYRUS SYLVESTRIS.

This made an utter failure, and is surely much over estimated.

LESPEDEZA STRIATA, JAPAN CLOVER.

This grew finely till frost, and is a plant from which much may be hoped. Once fairly the ground is seeded,

a good summer pasture will result each year, with no effort or trouble, and the poorest soil on which this plant will grow, in a few years will become fertile, and it is especially valuable for barrens or Black Jack ridges.

DESMODIUM MOLLE. FLORIDA CLOVER.

This very nutritious plant made a fine growth, averaging four feet before it bloomed; but not being sown thick enough, the stems were quite woody. It does not stand any frost.

GLYCINE HISPIDA (DOLICHOS SOJA). SOY BEAN.

Two species of this fine plant grew splendidly on our poorest soil giving eminent satisfaction. The trial would indicate that in some of these beans we should find a superior food plant that will thrive on our many acres of Alkali land.

ARACHIS HYPOGAEA. PEANUT.

This, on sandy soil did very well both as to forage and pods, and leads to the belief, that along the margins of creeks, where the soil is usually light, this plant could be profitably cultivated as food for hogs, giving a maximum of food with a minimum of labor.

VOUANDSIA SUBTERRANEA. EARTH NUT.

This new hog food did well, but the soil was not to its liking, and the crop was not an average in quantity.

VICIA LATHYRIODES. VETCH.

Seeds failed to germinate.

Six species of clovers were tried, but the insects made the series dismal failures, despite the use of sprays.

Still, in one place the common red clover made a fine growth, and now is in full bloom, with very luxuriant foliage, which may indicate that the cause of failure can be overcome.

Much was expected from the Crimson Clover, but it fell below its usual growth, and died with the first drouth. It will be tried again by planting this fall.

## ALFALFA.

This also failed to do well, and it is evident that the conditions needed for its growth are to be ascertained only after some years of experiment.

## MEDICAGO LUPULINA. YELLOW TREFOIL.

This annual proved of no value, dying soon after germination.

## MELILOTUS LEUCANTHA, SWEET CLOVER.

This made a fine growth, stood the heat well, and covered the ground, but died at the first cold, It merits further trial.

## CYPERUS ESCULENTUS. CHUFAS.

These made a splendid growth and an astonishing yield. For hog or chicken feed, this tuber cannot be surpassed, and as it requires but slight cultivation, it is recommended for further trial.

## COW PEAS.

These did all that could be asked of them in shading the ground and sweetening the soil, and we feel that this plant has justified our highest expectations.

As there is great confusion in the nomenclature of the cow pea family, the Director has begun an extended series of experiments with all the obtainable seeds of the families of Dolichos, Phaseolus, Vigna and Glycine, in the hope of obtaining data looking to a revision of these genera. It is also the intention, in the future to issue a Bulletin that shall present all the information gained in a form for reference.

By the kindness of the Directors of H. B. M. Botanic Gardens at Saharanpur, and Calcutta, India, a supply of seeds of plants of these genera has been obtained, with the native names, and it is expected that in some of these, something good for this climate and soil may be obtained.

# DEPARTMENT OF AGRICULTURE,

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## TEST OF VARIETIES OF GRASSES.

—BY—

A. C. MAGRUDER, AGRICULTURIST.

One year's work in this line can determine nothing definite. To find tame grasses for pasture and hay that will yield better and at the same time possess a higher feeding value than our native grasses, is the direct object of experiment number seven of the Department of Agriculture, which was begun eighteen months ago.

Aside from work done by the Director on this same subject I have tested seventy-three varieties of grasses and clovers and in a few instances have duplicated the work of the Director, making the work of both more valuable. The small quantity of seed procured limited the size of the plats to 4 by 8 feet. These were on hill land which was two years from the sod. A short dry spell at the time the seed were sown made it necessary to water the plats once. It is the practice of the Department to work with natural conditions as far as possible in all field work, that chances may be greater for the farmer to duplicate any work done on the station farm. Of the seventy-three varieties of grass in the test forty-one have died completely, or, being annuals, have failed to re-seed. Twenty-three varieties have passed through a trying summer and a very hard winter and have barely come out alive, while nine others have stood the heat and drought of the summer of 1892 and the freezing and thawing of the winter of 1892 and 1893.

It will not be out of place to state here that during

the summer of 1892 there were two dry spells of thirty-two and twenty-one days duration, and during the past winter the thermometer, according to observations made by the Director, was below the freezing point for a period of sixty-nine and eighty-six one hundredths days. Aside from this there were twenty-six hoar frosts. The lowest point reached by the thermometer during the winter was zero.

It would be folly for this department to suggest any varieties of grasses to be used for either hay or pasture with but the meagre knowledge gained from one year's test. Our farmers may be impatient for a solution of this grass question, and should be, for it is the most important point to be decided in Oklahoma agriculture. No one realizes this more than does this Department, and just so soon as the grass question is fully settled we will make the effort to have the varieties doing best generally disseminated throughout the territory. Until we do find out what grasses will do well here we can but give you our experience as we go.

#### LIST OF GRASSES TESTED.

"D" after a variety denotes that the variety is dead.

"M" after a variety denotes that the variety is growing fairly well.

"G" denotes that the variety is growing splendidly.

1. Indian Crowfoot.	Eleusine flagellifera	"D."
2. Indian Crowfoot.	Eleusine scindica	"D."
3. Panic Grass.	Panicum gibbum	"D."
4. Indian Crab Grass.	Panicum cimicinum	"D."
5. Indian Crowfoot.	Eleusine corocana	"D."
6. Wild Rye.	Elymus virginicus	"G."
7. Squirrel Tail.	Pennisetum longistylum	"D."
8. Meadow Grass.	Eragrostis diandra	"D."
9. Slender Meadow Grass.	Eragrostis pilosa	"D."
10. Meadow Grass.	Eragrostis conferta	"D."
11. Paspalum paniculatum.		"D."
12. Small Burr Grass.	Tragus racemosus	"D."

13. Texas Millet.	<i>Panicum Texanum</i>	"D."
14. Pennisetum Cenchroides.		"D."
15. Teff.	<i>Eragrostis abyssinica</i>	"M."
16. Spike Grass.	<i>Diplachne imbricata</i>	"D."
17. Meadow Grass.	<i>Eragrostis rachitricha</i>	"M."
18. Early Spring Grass.	<i>Eriochloa punctata</i>	"M."
19. Texas Crab Grass.	<i>Schedonnardus texanus</i>	"M."
20. Indian Millet.	<i>Panicum frumentaceum</i>	"M."
21. Feather Grass.	<i>Setochloa mucronata</i>	"M."
22. Tetrapogon tetrastochys		"D."
23. Early Spring Grass.	<i>Eriochloa annulata</i>	"D."
24. Panic Grass.	<i>Panicum anceps</i>	"D."
25. Meadow Grass.	<i>Eragrostis ciliaris</i>	"D."
26. Australian Finger Grass.	<i>Setochloa subdigitata</i>	"D."
27. Long Smut Grass.	<i>Sporobolus indicus</i>	"D."
28. Black Beard Grass.	<i>Pappophorum nigricans</i>	"M."
29. Beard Grass.	<i>Polypogon monspeliensis</i>	"M."
30. Branching Water Grass.	<i>Paspalum virgatum</i>	"D."
31. <i>Eriochloa aristata</i> .		"D."
32. Palmer's Panic.	<i>Panicum palmeri</i>	"D."
33. Many Flowered Millet.	<i>Oryzopsis miliacea</i>	"D."
34. Red Panic.	<i>Panicum teneriffe</i>	"D."
35. Carpet Grass.	<i>Paspalum platycaule</i>	"D."
36. Water Grass.	<i>Paspalum dilitatum</i>	"D."
37. Pennisetum lanuginosum		"M."
38. Wooly Panic.	<i>Panicum lacnanthum</i>	"D."
39. Sharp Scaled Grass.	<i>Eragrostis oxylepis</i>	"D."
40. Animated Oat Grass.	<i>Avena sterilis</i>	"M."
41. Spear Grass.	<i>Aristida depressa</i>	"D."
42. Japanese Rye.	<i>Agropyrum japonicum</i>	"G."
43. Mountain Burr Grass.	<i>Cenchrus montanus</i>	"D."
44. Star Grass.	<i>Chloris virgata</i>	"M."
45. Australian Blue Joint.	<i>Chrysopogon serrulatus</i>	"M."
46. Star Grass.	<i>Chloris barbata</i>	"M."
47. Star Grass.	<i>Chloris swartziana</i>	"D."
48. Turkey Grass.	<i>Andropogon Hollii</i>	"D."
49. Umbrella Grass.	<i>Chloris acicularis</i>	"D."
50. Windmill Grass.	<i>Chloris truncata</i>	"D."
51. Meadow Foxtail.	<i>Alopecurus pratensis</i>	"D."
52. Star Grass.	<i>Chloris divaricata</i>	"M."
53. Wire Bunch Grass.	<i>Agropyrum divergens</i>	"D."
54. <i>Brachypodium distachyum</i> .		"M."
55. Quaking Grass.	<i>Briza rufibarbis</i>	"D."
56. Kangaroo Grass.	<i>Anthistiria avencea</i>	"M."
57. Creeping Grama.	<i>Boutelona prostrata</i>	"M."

58. Japan Lespedeza.	Lespedeza cyrtobotrya	"M."
59. Rice Grass.	Oryzopsis cuspidata	"D."
60. Ring Grass.	Andropogon annulatus.	"M."
61. Clover Head Grass.	Muhlenbergia glomerata	"D."
62. Bermuda Grass.	Cynodon dactylon	"G."

The following grasses were obtained from a farmer in Denmark who could give only the common names. The varieties will be identified here as soon as possible and the botanical names given.

63. Danish Yellow Clover.	64. Danish Red Clover.
65. Swedish Clover.	66. Danish Blood Grass.
67. Danish Pasture Grass.	68. Danish Pasture Grass.
69. Orchard Grass.	70. Italian Rye Grass.
71. Danish Oat Grass.	72. Danish Timothy.

Those grasses which have done best up to this time deserve more than a mere mention of the fact. It is somewhat surprising that of the nine successful varieties six are from seed brought from Denmark. That grasses from such a moist and cold climate should do well here in a dry and hot climate is strange; yet the growth of Danish grasses on the farm indicates that we are correct in our statements. Two of the nine came from seed obtained from the Mississippi Experiment Station and one is the well-known Bermuda which constitutes the principal pasture grass of nearly all of the southern states.

The nine grasses which have successfully passed an Oklahoma summer and winter are:

1. Wild Rye.	Mississippi Ex. Station
2. Japanese Rye.	Miss. Ex. Station.
3. Bermuda.	M. W. Johnson Atlanta, Ga ,
4. Danish Red Clover.	Denmark.
5. Swedish Clover.	Denmark.
6. Danish Blood Grass.	Denmark.
7. Danish Yellow Clover.	Denmark.
8. Danish Pasture Grass.	Denmark.
9. Danish Oat Grass.	Denmark.

Even with our present knowledge gained from the

observations made it is not possible to say that this or that grass is the proper kind to sow.

A good example of the value of an opinion based on limited observations may be gained by referring to my annual report to the Board of Regents. Under date of October 14th, 1892, I say: I recognize the value to the farmers of the territory in finding tame grasses for hay and pasture to supplant our wild grasses.

“It is impossible to make any recommendations from the short test that has been made, not having had a winter to determine how the grasses will withstand the cold; but those which have best withstood the two droughts of last summer are:

Panic Grass.	<i>Panicum gibbum.</i>
Early Spring Grass.	<i>Eriochloa punctata.</i>
Red Panic Grass.	<i>Panicum teneriffe.</i>
Carpet Grass.	<i>Paspalum platycaule.</i>
Wooly Panic Grass	<i>Panicum lacnanthum.</i>
Spear Grass.	<i>Aristida depressa.</i>
Star Grass.	<i>Chloris barbata.</i>
Clover Head Grass.	<i>Muhlenbergia glomerata.</i>
Bermuda Grass.	<i>Cynodon datylon glomerata.</i>

At this writing, May 5th, 1893, of the nine varieties mentioned in the report of October seven are dead, one (Bermuda) was winter-killed but is now putting out nicely from the roots, while the Star Grass is now classed with those doing moderately well. Several years will necessarily be consumed in this line of work during which time grasses from different countries will be introduced, the poor ones discarded while those of any value will be thoroughly tested.

#### A SUBSTITUTE FOR GRASS.

The next best service that we can do the farming classes is to find a substitute for tame grasses until the



right grass for this country is found. Investigations on this subject were begun simultaneously with the grass work, and though this work is by no means complete our recommendations in this line are substantiated by work here and elsewhere.

The crop suggested as worthy of a fair trial is the Cowpea, (*Dolichos Sinensis*.)

Soy beans have been highly recommended to the farmers of Kansas by the department of Agriculture of the Kansas Agricultural College.

Either crop produces from two to three tons of fine hay per acre, and will mature in less than one hundred days, so they may be planted after wheat is taken from the soil and a heavy hay crop made before fall wheat seeding time.

A quart of Cowpeas will be sent free to any farmer in Oklahoma who may apply for them.

The object of this is to get the crop introduced throughout the territory.

As to the value of the crop I would refer you to the chemist's report on page 37 of this bulletin.

#### OUR NATIVE GRASSES.

A series of experiments with native grasses to improve them by cultivation and manuring are in progress. Reports of this work will be given later with results as to the least outlay of time and money and the best methods of transforming prairie into tame grass pastures and meadows.

DEPARTMENT OF CHEMISTRY.

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SOME ANALYSES OF  
GOW PEAS AND PRAIRIE GRASS,

BY GEO. L. HOLTER, CHEMIST.

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**These results compared with a few other feeding stuffs. Cotton-seed meal.**

Before taking up the consideration of the analyses a few explanatory remarks, we believe, will make the comparisons more clearly understood.

The food of an animal, as well as the animal, contains four classes of substances (i. e.) protein, ash, fat and water. Since we are considering the analyses from a water free standpoint the water will not be considered. only, it may be, incidentally.

Aside from these substances there are large quantities of carbohydrates being represented principally by starch sugar and woody fiber. These carbohydrates contain no nitrogen and, with the exception of the fiber are completely digested or nearly so.

Water, which is generally available at little or no ex-

pense, is present in all foods. In green forage crops it is present in quantities varying from 70 to 90 per cent. Of course the more water the less of solid matter and naturally the less valuable the food. A food is bought for the amount of water it does not contain, other things being equal, rather than the water it does contain.

The ash is necessary for bone and tissue formation. The fat supplies the fuel to keep the animal warm and may also be said to be the chief source of motive power.

Aside from this the fat in connection with the carbohydrates serves as a source for new fat.

Protein keeps up the constant wear of the animal machinery and in young and growing animals is the principal source of material which produces growth.

It is also necessary for the production of wool in sheep and is the source of the casein of milk in milk producing animals.

The fiber is the cellular or woody portion of the plant or food and is present in percentages from 1-2 to 50.

If you will remember these few explanatory remarks or by reference to them a much more intelligent interpretation of the analyses can be obtained.

What may be a well balanced ratio for one purpose, may not be so good for another. Oxen at work should be fed on a different basis from those fed for beef. Take as an example: Steers weighing 1000 pounds, working hard, should be fed daily such a ration that they would receive

2.6 pounds digestible protein,  
13.7 pounds of digestible carbohydrates,  
.7 pounds digestible fat.

Steers weighing 1000 pounds, fed for beef, should receive daily:

2.8 pounds digestible protein,  
15.8 pounds digestible carbohydrates,  
.8 pounds digestible fat.

We have no digestion coefficients for cow peas or prairie grass and in the absence of which will assume the coefficients to be the same as those for pasture grass.†

† Penn. Report 1889, p-98.

Protein, - 75.2 per cent.  
 Carbohydrates, 75.2 per cent.  
 Fat, - 84.4 per cent. †

It is not the desire or intention of this department to do any guess work, hence we give the above percentages as approximations only for cow peas and prairie grass.

The first four samples were taken at different periods of growth, and the last one taken after the pea pods had been removed and vines were killed by frost.

Variety	No. 1, Cut Aug. 20, '92.	No. 15, Cut Sept. 9, '92.	No. 18, Cut Sept. 28, '92.	No. 20, Cut Oct. 5. '92.	No. 21, Cut Oct. 7 '92.
Whippoorwill.					
Ash . . . . .	12.79%	9.04 %	9.10 %	8.77 %	6.31 %
Protein . . . . .	19.64 "	17.57 "	17.26 "	19.05 "	10.01 "
Fiber . . . . .	27.33 "	22.34 "	20.81 "	20.58 "	35.24 "
Carbohydrates .	33.36 "	45.72 "	46.78 "	45.43 "	46.01 "
Fat . . . . .	6.88 "	5.33 "	6.05 "	6.17 "	2.43 "

In these five samples it will be observed that the protein in the first three constantly decreases. The fat decreases in the second but increases in the third. In No. 20 there is quite an increase in the protein, also the fat over 2 and 3. The carbohydrates have changed but very little. The increase in protein is explained by the presence at this time of the matured peas in the sample. Sample 21, taken after the peas had been harvested, gives an exceedingly poor grade of forage crop. Enthusiasts on the cow pea subject claim that you may let the peas mature, harvest them, then cut the vines for hay. We will not deny that this may be done, but when you have harvested the peas, which will be after the frost has killed the leaves, there is nothing left but an insipid stalk which will not be eaten very readily by any animal if at all. To express it in a different way, these dry stalks do not make a succulent food.

What little work we have done does not settle the cow-pea question, but thus far our results would indicate that for a good hay the peas, including vines, leaves and pods, should

†Penn reports assumes the amides to be wholly digested.

be harvested as soon as the peas have matured in the pods. Should the crop be late it is better to cut before complete maturity than to delay the harvesting until a heavy frost has killed the vines and leaves. This is not only the opinion of our agriculturist, who is deeply interested in this crop, but it is clearly demonstrated by a chemical analysis.

Comparing of our averages with those of Jenkins and Winton† quite a range of difference is observed.

	Oklahoma Station *	Jenkins & Winton
Ash.....	9.92%	10.50%
Protein.....	18.38 "	14.30 "
Fiber.....	22.76 "	29.00 "
Carbohydrates.....	42.82 "	43.60 "
Fat.....	6.11 "	2.60 "

It is not to be expected that these results should agree very closely since Jenkins & Winton's averages are the results of several varieties while we have but a one variety. (Whippoowill.)

I am unable to account for my high fat results since the extract was determined with carefully prepared ether.

#### PRAIRIE GRASS.

These samples are composed almost wholly of blue-stem and blue-joint. Samples 2 and 4 were cut on the same day (September 2th, 1892,) and No. 2 taken as soon as the hay was cured. No. 4 was left in the field, as cut, for five days before drawing the sample for analysis, and a day or two after cutting quite a heavy rain fell. Sample No. 3 was cut August 3rd.

Prairie Grass.	No. 2.	No. 3.	No. 4.	Av'r'ge
Ash.....	7.02%	7.12%	6.53%	6.89%
Protein.....	5.94 "	8.04 "	5.94 "	6.63 "
Fiber.....	34.30 "	34.36 "	35.99 "	34.88 "
Carbohydrates.....	49.05 "	47.50 "	47.67 "	47.74 "
Fat.....	3.69 "	3.98 "	3.87 "	3.85 "

An examination of the analysis will show the earlier

†American Feeding Stuffs p-48,

\* No. 21 not included.

cutting to be much richer in protein and fat, also containing more fat and fiber than Kentucky blue grass, but not as much carbohydrates.

Table containing the averages of several feeding stuffs:

	Cow Pea, Okla. Station. †	Prairie Grass, Okla. Station.	Cow Peas, J. & W.	Alfalfa, J. & W.	Mammoth Red Clover, J. & W.	Cotton Seed Meal J. & W.	Soja Bean, J. & W.	Kentucky Blue Grass J. & W.
Ash .....	8.77	6.89	10.50	8.1	7.3	7.8	9.5	5.7
Protein .....	19.05	6.63	14.30	15.5	13.5	46.1	12.0	6.6
Fiber .....	20.58	34.88	29.00	27.3	31.3	6.1	29.0	30.7
Carbohydrates	45.43	47.74	43.60	46.6	43.0	25.8	45.7	54.2
Fat .....	6.17	3.85	2.60	2.4	4.9	14.2	3.8	2.8

An examination of the preceding analyses will show the matured cow peas to be a first class food stuff, outranking all on the list in protein, with the exception of cotton seed meal.

Taking the average yield of cow peas to be two tons per acre and that of prairie grass one ton per acre as an actual food stuff, one acre of cow peas is worth 5.74 acres prairie grass. Let us go one step further. In harvesting the equivalent of one acre of cow peas, in prairie grass, you have to go over 5.74 acres.

While all the constituents present in a food stuff may have certain functions to perform some are much more important than others. Take the ash of pasture grass as an example and we find 48 per cent of it digestible, yet we do not experience any difficulty in getting sufficient ash present. The same may be said of fiber and as a general rule, fat also. This question of importance is not one from a physiological point of view only but from a financial point of view as well. You cannot afford to pay as much for ash and fat as you do for protein since the return you get from a given amount of protein will be much greater than that from an equal amount of ash or fat.

† After peas had matured.

A simple guide, which you will readily comprehend, will be to compare the percentage of protein of the various food stuffs found in the table. This is not an absolute method for determining the food value of a given crop neither is it a scientific way of expressing it but to the uninitiated this simple comparison will be more intelligently understood than an elaborate array of figures and scientific terms.

#### COTTON-SEED MEAL.

There appears to be a question in the minds of a great many farmers in our territory as to the advisability of feeding cotton-seed meal to stock. From the preceding table it is seen that cotton-seed meal is very rich in protein, low in fiber and high in carbohydrates and fat. The analysis shows it to be rich in food elements, and since it is as cheap as wheat bran or corn chop there is no reason why more of it should not be used. Some have used it with negative results and naturally condemn it. Here the fault was with the feeder and possibly with the animal fed, but certainly no fault of the feed.

Cotton-seed meal is not good for hogs or young pigs. The general experience is that young pigs soon die when given this feed and that hogs will not thrive upon this diet and should it be persisted in for two or three months they, too, will die.

In a few isolated cases calves have been fed a light ration of cotton seed meal and milk and have grown fairly well, while others have died.

I will quote from the Pa. Report '91, p. 94: "Two calves were each fed daily one pound of cotton-seed meal stirred up in two pounds of hot water and added to sixteen pounds of skim milk. One was born March 26, placed on trial May 26, and died July 4. Two were born May 28, and placed on trial July 13. One died August 16, and the other at this date, September 19, is in good health and has made a fair gain." From those who have had experience we learn that cotton-seed meal cannot be fed to calves and hogs with profit.

While the stock does not always die the animals do not grow sufficiently well to make it at all profitable.

Cotton-seed meal may be fed to milch cows both winter and summer if proper judgment is used as to quantity.

In the winter from five to seven pounds may be fed daily with very satisfactory results but in the hot summer months this quantity should be considerably decreased.

On a cotton-seed meal feed, cows almost invariably give more milk and while the fat content is not increased the actual fat produced is proportionally greater with the increase of milk given.

The manure produced by cows on a cotton-seed feed is much more valuable than that produced by cows fed either wheat bran or corn chop.

The objection is raised that the butter produced will not have as fine a flavor as it would were the cows fed bran or corn. This is, no doubt true when a butter commission merchant is consulted, yet a couple pounds of cotton-seed meal may be fed each day with very good results as to increase in milk, and the grade of the butter not perceptibly lowered.

In this feed the redeeming feature, for this warm climate of ours, is the raising of the melting point of the butter produced.

Where cool spring water is scarce and ice very seldom available any thing that will raise the melting point of butter, without materially injuring the flavor, should at least receive thoughtful consideration and a fair trial.





BULLETIN.—FREE.

OKLAHOMA

Experiment Station,

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