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Tankage and Other By-Products for Pigs.

Shrunken Wheat for Swine.

DEPARTMENT OF ANIMAL HUSBANDRY.

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Tankage and Other By-Products for Pigs.

JAMES W. WILSON. H. G. SKINNER.

The word "by-product" is applied to a class of substances which during the process of manufacture at the mills and factories remain after the more valuable materials have been extracted. There are several kinds of these by-products in the market for sale as feeding stuffs, such as gluten meal, cotton-seed meal, oil meal, tankage, blood meal, bran, etc., and some have been found to be of great value to the stockman when fed in conjunction with our commonly grown grains. They are valuable for feeding purposes because they contain, in abundance, the protein or nitrogeneous part of a feed so necessary for the growth of the animal.

Young animals which have been fed on a ration consisting of corn or barley, both highly carbonaceous, never become as large and vigorous as those fed on a ration containing both protein and carbohydrates; or roughly speaking, the flesh-forming and fat-forming elements.

As early maturity is highly desirable in all live-stock markets the necessity of adding a feed of this nature for the development of the framework of the body is very evident.

Breeders of pure-bred swine, whose object it is to improve the quality of their herds from year to year, cannot afford to feed their pigs on a ration that is of a highly carbonaceous nature, as this kind of a feed is delcterious to the health and general usefulness of the animal as a breeder.

Disease would not be so prevalent among swine in some sections of the country if more attention were given to the character of the feed.

Skim milk may be considered a by-product on the farm, and for growing pigs it is doubtful whether there is any other feed quite so good to feed with the carbonaceous grains. This experiment shows its value. But skim milk is not always available. Ground flax is also valuable for a pig feed but can hardly be considered in the same list as the by-products aforementioned; however, the effect of a small quantity mixed with the daily feed is soon noticeable.

This experiment was undertaken in order to determine the relative feeding value for pigs of tankage, blood meal, linseed meal, ground flax, and skim milk when fed with ground barley as a basal grain ration. It was also desirable to determine the value of rape as a pasture for pigs when receiving all the grain they would eat; and further, to note the practicability of feeding these by-products with grain when the pigs were on rape pasture.

The rape was sowed the latter part of May and was about 18 inches high at the beginning of the experiment. It was divided into six different lots containing about one-fourth acre each. A dry lot of equal size was also provided to serve as a check lot with the one receiving rape. Lot II, or the one that was receiving barley and rape, was the check lot for the lots receiving barley, the by-products, and rape pasture.

On October fifth forty-two head of pigs of April and May farrow were divided into seven lots of six head each, making them as uniform as to size and breed as possible, and weighed up for the experiment.

Representatives of four different breeds and two cross breeds were included as shown by the tables of weights and gains. Lot I received ground barley; lot II ground barley and rape pasture; lot III ground barley and blood meal mixed in the proportion of nine pounds of the former to one of the latter, and rape; lot IV ground barley, tankage mixed in the proportion of six pounds of the former to one of the latter, and rape; lot V ground barley, oil meal mixed in the proportion of five pounds of the former to one of the latter, and rape; lot VI ground barley and skim milk, fed in the proportion of one pound of the former to three of the latter, and rape; lot VII

ground barley and ground flax mixed in the proportion of nine pounds of the former to one of the latter, and rape.

Each lot was fed morning and evening all they would eat of these feeds and had access to salt and soft coal at all times. There was one pig in lot VII that died during the test on account of an abscess in the lung but otherwise the lots were healthy during the entire feeding period.

The following were the local market prices of the feeds used in the experiment:

Ground barley, thirty-four cents per fifty pounds.

Flax, one dollar per bushel.

Tankage, forty dollars per ton.

Blood meal, fifty-four dollars per ton.

Oil meal, thirty-two dollars per ton.

Skim milk, fifteen cents per hundred.

These pigs had access to small houses in the rape pasture until cold weather, or December first, when they were brought to the barn and fed the same grain ration as before; except lot II which received a small allowance of beets daily. The gains, however, were not as good in any of the lots after their quarters were changed as when on the rape pasture, and with the lot that received barley and beets the gain was no larger than with the lot that received barley alone.

TABLES OF WEIGHTS AND GAINS.

LOT I.

BARLEY.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
581	Duroc-Jersey	84	116	154	180	96
382	Poland China	102	120	145	182	80
265	Yorkshire	104	157	194	226	122
6674	Berkshire Cross	110	145	186	217	107
4223	Berkshire Cross	108	148	192	230	122
390	Yorkshire	77	100	131	162	85
Gain			201	216	195	612
Average gain per head			33	36	32	102

LOT 11.

BARLEY AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
3880	Poland China	100	130	160	191	91
509	Duroc-Jersey	104	142	188	222	118
225	Yorkshire	105	146	188	215	110
645	Berkshire Cross	93	131	167	201	108
90160	Yorkshire	118	156	200	230	112
51201	Yorkshire	97	135	178	216	119
Gain			223	241	194	658
Average gain per head			37	40	32	109

LOT 111.

BARLEY, BLOOD MEAL AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
686	Yorkshire	80	120	168	200	120
208	Yorkshire Cross	110	152	197	230	120
126	Yorkshire	131	187	247	283	152
377	Poland China	91	132	173	212	121
271	Duroc-Jersey	87	127	168	200	113
22	Berkshire Cross	123	173	204	256	133
Gain			269	266	224	759
Average gain per head			45	44	37	126

LOT IV.

BARLEY, TANKAGE AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
228	Chester White	98	132	170	186	88
96018	Duroc-Jersey	90	138	186	220	130
1367	Yorkshire Cross	128	179	234	275	147
1463	Yorkshire	85	140	193	220	135
89	Berkshire Cross	113	160	208	250	137
191	Yorkshire	90	122	200	238	148
Gain			267	320	198	785
Average gain per head			44	53	33	130

LOT V.

BARLEY, OIL MEAL AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
313	Duroc-Jersey	91	133	177	200	109
96022	Berkshire Cross	98	158	214	248	150
3874	Chester White	92	128	173	200	108
513	Yorkshire	107	154	223	254	147
429	Yorkshire	109	155	203	233	124
649	Berkshire Cross	108	149	204	242	134
Gain			272	317	183	772
Average gain per head			45	53	30	129

LOT VI.

BARLEY, MILK AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
71	Yorkshire Cross....	126	196	250	296	170
90624	Berkshire Cross....	127	183	240	277	150
441	Poland China	63	108	156	183	120
533	Duroc-Jersey.....	70	131	174	204	134
534	Chester White.....	99	152	204	240	141
378	Yorkshire.....	113	188	255	307	194
Gain.....		.....	360	321	228	909
Average gain per head....		.....	60	53	38	151

LOT VII.

BARLEY, FLAX AND RAPE.

NO.	BREED	OCT. 5	NOV. 2	DEC. 1	DEC. 28	GAIN
452	Poland China.....	91	117	164	195	104
59	Yorkshire.....	103	142	197	232	129
261	Yorkshire.....	118	166	218	235	117
217	Duroc-Jersey.....	101	147	201	247	146
94	Berkshire Cross....	120	173	228	254	134
Gain.....		.....	212	263	155	630
Average gain per head....		.....	42	52	31	126

VALUE OF RAPE.

At the close of this experiment these hogs were worth four cents per pound in the local market. From the above tables it may be seen that the lot fed barley and rape gained forty-four pounds more than the lot fed barley without the rape. The two lots consumed practically the same quantity of grain, and it required five and seventy-seven hundredths pounds of barley to produce a pound of gain in lot one, and for forty-four additional pounds of gain it should have required two-hundred and fifty three and eighty-eight hundredths pounds more of barley at thirty-four cents per fifty pounds which is the value of the quarter acre of rape.

The table of weights and gains for these two lots shows this additional gain was made while they were on rape pasture,

as the gains for these two lots after bringing to the barn were the same.

The following table shows the kinds of feeds fed, the number of pigs at the close of the test, pounds of ground barley fed, pounds of by-products fed, the proportion in which the feeds were mixed, total gain, total number of pounds of feed fed, pounds of feed per pound of gain, average gain per head daily, and the cost of producing one hundred pounds of gain for each lot.

	Number of Pigs	Pounds of Barley fed	Pounds of By-Products fed	Mixed in Proportion	Total number pounds of feed fed	Gain per lot	Pounds of feed for pound of gain	Average gain per head	Cost per hundred pounds gain
Lot I Barley.....	6	3535			3535	614	5.77	102	3.91
Lot II Barley and rape	6	3540			3540	658	5.38	110	3.92
Lot III, Barley Blood meal and rape.	6	3282	364	9 to 1	3646	759	4.80	126	4.46
Lot IV, Barley Tankage and rape.....	6	3187	531	6 to 1	3718	785	4.73	131	4.33
Lot V, Barley Oil meal and rape.....	6	2978	595	5 to 1	3573	772	4.62	128	4.08
Lot VI, Barley Skim Milk and rape.....	6	3487	10461	1 to 3	13948	909	15.34	151	4.51
Lot VII, Barley Ground flax and rape.....	5	2631	292	9 to 1	2923	630	4.63	126	3.93

In calculating the cost of producing one hundred pounds of gain, the rape pasture is valued at $7.04 per acre as this was found to be its actual value according to the difference in gain made by lot II and lot I at four cents per pound.

The difference in the cost of producing a pound of gain in the six different lots on rape pasture was 59 cents per hundred pounds, an item worthy of notice, while the difference in the average gain per head was 41 pounds.

Assuming that all conditions were equal for each lot this

test indicates that for a rapid growth skim milk was unequaled, but for the cheapest gain rape and barley were the best.

With the other four lots fed on tankage, blood meal, oil meal and ground flax there was only a difference of five pounds of gain per head during the whole experiment, but the difference in the cost of producing this extra gain amounted to 54 cents per hundred which is also worthy of notice in pig raising. However, the lots that received the by-products consumed a larger quantity of feed and made larger gains than those fed barley and rape or barley alone. This condition may be accounted for from the fact that the by-products evidently served as an appetizer and increased the palatability of the different rations over that of the lots not receiving a by-product. In lot III by adding 364 pounds of blood meal, which cost $9.82, there was a saving of 258 pounds of grain, which was worth $1.76, and an extra gain of 101 pounds was made which at 4 cents per pound was worth $4.04. Deductiug the latter two items from the former there was a loss of $4.02 for the lot by feeding blood meal as compared to returns from the lot fed barley and rape.

In lot IV by adding 531 pounds of taukage worth $10.62 it caused a saving of $3.06 worth of grain but produced 127 pounds extra gain over lot II and was worth $5.08 which deducted from the extra cost renders a loss of $2.48 for the lot.

Tankage is a by-product from the slaughter houses and consists of waste meat scraps and trimmings. It is prepared by heating up the whole mass in a vat, thereby destroying all germs. The grease is then drawn off and the refuse is dried under steam heat and sold as tankage.

In lot V by adding 595 pounds of oil meal, worth $9.52, there was a saving of 562 pounds of barley, worth $3.82; and an extra gain of 114 pounds, worth $4.56. Deducting the sum of the two latter from the former there is a loss of $1.14 for the lot.

In lot VI by adding 10,461 pounds of skim milk, worth $15.69, there was a saving of 34 cents worth of grain for an extra gain of 251 pounds, worth $10.04. Deducting the sum of the two latter items from the former there was a loss of $5.31 as compared to lot II. However, skim milk is considered on many farms as a waste product but for rapid gains this test

shows that it is unequalled. And in lot VII by adding ground flax to their barley ration there was a gain of 16 pounds per head over lot II. This was the only lot receiving a mixture that made a gain cheaper than the market price of hogs.

It is evident that all of these by-products are valuable for the growth of the pig and the extent to which they can be fed with profit would depend on the price of grain and the finished animal on the market.

On account of the more rapid gains, breeders of pure-bred swine can afford to feed any of the by-products used in this experiment at a profit but before doing so a careful study should be made of the table of weights and gains for each lot included therein.

THE VALUE OF SHRUNKEN WHEAT FOR FEEDING SWINE.

During the past season a large per cent. of the wheat throughout the Northwest was more or less damaged by rust, thus diminishing its value for milling purposes. This experiment was undertaken in order to determine the comparative value of this quality of wheat for feeding purposes.

Two lots of wheat were purchased, one grading 57 and the other 44 pounds per bushel. Four cross-bred Yorkshire and Poland China hogs were selected from the college herd, divided into two pens of two head each and weighed up for the experiment. These hogs were of the same litter and as near uniform in every respect as possible. The feed for each lot was ground, weighed, and mixed into a thick slop before feeding.

The following table shows the kind of wheat fed, number of pigs, weight at beginning, weight at end, gain, pounds of wheat fed, pounds of wheat per pound of gain, gain per head daily and value received per bushel, with hogs at four cents per pound, for each lot.

TABLE OF FEEDS AND GAINS.

Kind of Grain	No. of Swine	Weight at the beginning	Weight at the end	Gain	Pounds of wheat fed	Pounds of wheat for pound of gain	Gain per head daily	Value Received per bu. Hogs 4 cents per lb.
57 lb wheat	2	448	706	258	980	3.8	2.3	.63
44 lb wheat	2	426	648	222	939	4.2	2.	.57

In other words, when wheat was turned into 4 cent pork, 63 cents per bushel was realized for 57 pound wheat and 57 cents for 44 pound wheat.

The following analysis of the wheat was made by James H. Shepard, Chemist of this Station.

ANALYSES OF WHEAT.

	AIR DRY SUBSTANCE		WATER FREE SUBSTANCE	
	57 lb Wheat	44 lb Wheat	57 lb Wheat	44 lb. Wheat
Water	5.76	6.07	.....	.....
Ash	2.36	2.14	2.54	2.28
Ether Extract	2.46	2.84	2.61	3.02
Crude Fiber	3.45	4.93	3.66	5.25
Crude Protein	13.21	12.01	14.01	12.79
N-free Extract	72.76	72.01	77.18	76.66
Total Nitrogen	2.32	2.11	2.46	2.24
Albuminoid Nitrogen	1.91	1.81	2.02	1.92

In both of these analyses the per cent. of crude protein is larger in the fifty-seven than in the forty-four pound wheat, while the per cent. of crude fibre in the forty-four pound wheat is considerably larger, which condition may be attributed to the decreased gain in the poor wheat lot on account of its indigestible nature.