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Utah Agricultural College,
Department of Horticulture.



THE AGRICULTURAL COLLEGE
OF UTAH.

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Experiment Station.

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BULLETIN NO. 40.

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*The Economic Production of Pork,*

By A. A. Mills.

December 1895.

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# BULLETIN NO. 40.

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## The Value of Grass and its Relation to Exercise, in the Production of Pork.

- (a) *With full grain rations.*
- (b) *With part grain rations.*
- (c) *Without grain.*

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A. A. MILLS.

This bulletin contains the detailed results of two years' work along the lines indicated, and a summary of the work of four years as far as it has been carried along these same lines.

In the summer of 1894, twelve lots of pigs were selected. They were purchased in Cache valley, and were a fair average of the pigs raised here. It was originally intended to put three pigs in each division, but just at the time of beginning the experiment it was difficult to procure enough animals of the proper age and size, so that the lots contained but two pigs each. These were fed as follows for 91 days:

Lot 1. In pen with full grain ration without grass.

- Lot 2. In pen with full grain ration with grass.
- Lot 3. In pen with one-fourth grain ration with grass.
- Lot 4. In pen without grain, grass alone.
- Lot 5. In yard with full grain ration without grass.
- Lot 6. In yard with full grain ration with grass.
- Lot 7. In moveable pen in pasture, with full grain ration.
- Lot 8. Loose in pasture with full grain ration.
- Lot 9. Loose in pasture with three-fourths grain ration.
- Lot 10. Loose in pasture with one half grain ration.
- Lot 11. Loose in pasture with one-fourth grain ration.
- Lot 12. Loose in pasture without grain.

This period of 91 days covered the time from June 27, to September 26, 1894. The grain consisted of ground barley and wheat bran in equal proportions by weight. It was mixed into a slop just before feeding, twice daily, and the feeding was done about the same time each day. The lots on full feed were fed all they would eat up clean. The amount fed to the lots on part rations was determined by the amount eaten by those on full feed under otherwise similar conditions. The lot fed on the one-fourth ration in the pen was fed just one fourth of the amount eaten by the lot in the pen fed grass and a full grain ration, while the part rations for those loose in the pasture was determined by the consumption of those on full ration loose in the pasture.

The hog house pens were 8x10 feet. Connected with each was a small yard 8x16 feet. Lots 1 to 4, inclusive, were fed in these pens and were allowed to run in the small yards. Lots 5 and 6 were fed in yards of about 4x5 rods each. At first lot 6 was fed in a different yard from lot 5, but was put in the same yard with lot 5 at the end of the first month, because it was thought probable that lot 6 was getting some feed from the horse manure thrown into their yard. After being put in the same yard, these lots were run into pens to feed and turned back into the yard as soon as the meal was over. Both lots had free access to a shed.

The moveable pen in which lot seven was confined in the

pasture was 16x12 feet, and it was moved twice daily. The pigs that ran loose in the pasture were put into small pens and were fed their grain ration twice daily; they were turned loose after each meal. They had the run of an eighteen acre pasture of mixed grasses and lucerne, the lucerne constituting about one-half of the whole mixture.

#### CHANGE OF RATIONS.

After being fed in the manner described for the 91 days the pigs were all put on full feed and kept on it for 70 days, when the experiment closed, December 5, 1894. Those in the hog house pens and those in the yard were fed no grass during this latter period, September 26, to December 5. Lot 7 was not confined to the moveable pen during this period but was allowed to run loose with the others in the pasture. After October 29, the grain was composed of wheat and corn, ground and mixed in equal proportions by weight, instead of barley and bran as theretofore.

The pigs were weighed three days in succession at the beginning of the experiment and again at the change of rations and again at the end of the experiment. The average of the three days weighing at each time was taken as the weight of the lots. Table I gives the average of the three weights and the weekly weights and gains of the first six lots, those fed in the pens and yard. There are two pigs in each lot.

TABLE I.  
Weights of pigs fed in pens and in yards.

|                                   | Lot 1.                           | Lot 2.                                  | Lot 3.                                         | Lot 4                           | Lot 5.                         | Lot 6.                                 |
|-----------------------------------|----------------------------------|-----------------------------------------|------------------------------------------------|---------------------------------|--------------------------------|----------------------------------------|
| 1894.                             | Fed full ration of grain in pen. | Fed grass and full grain ration in pen. | Fed grass & $\frac{1}{4}$ grain ration in pen. | Fed grass without grain in pen. | Fed full grain ration in yard. | Fed grass & full grain ration in yard. |
| Average, June 25, 26, 27.....     | 156                              | 153                                     | 209                                            | 232                             | 148                            | 146                                    |
| July 2.....                       | 174                              | 166                                     | 204                                            | 212                             | 162                            | 162                                    |
| Gain.....                         | 18                               | 13                                      | * 5                                            | *20                             | 14                             | 16                                     |
| July 9.....                       | 190                              | 184                                     | 206                                            | 210                             | 180                            | 180                                    |
| Gain.....                         | 16                               | 18                                      | 2                                              | * 2                             | 18                             | 18                                     |
| July 16.....                      | 200                              | 198                                     | 204                                            | 196                             | 192                            | 186                                    |
| Gain.....                         | 10                               | 14                                      | * 2                                            | *14                             | 12                             | 6                                      |
| July 23.....                      | 220                              | 224                                     | 220                                            | 192                             | 216                            | 212                                    |
| Gain.....                         | 20                               | 26                                      | 16                                             | * 4                             | 24                             | 26                                     |
| July 30.....                      | 242                              | 240                                     | 226                                            | 198                             | 240                            | 222                                    |
| Gain.....                         | 22                               | 16                                      | 6                                              | 6                               | 24                             | 10                                     |
| August 6.....                     | 263                              | 264                                     | 232                                            | 194                             | 258                            | 236                                    |
| Gain.....                         | 21                               | 24                                      | 6                                              | * 4                             | 18                             | 14                                     |
| August 13.....                    | 274                              | 280                                     | 240                                            | 192                             | 286                            | 258                                    |
| Gain.....                         | 11                               | 16                                      | 8                                              | * 2                             | 28                             | 22                                     |
| August 20.....                    | 304                              | 306                                     | 246                                            | 192                             | 306                            | 280                                    |
| Gain.....                         | 30                               | 26                                      | 6                                              | 0                               | 20                             | 22                                     |
| August 27.....                    | 314                              | 322                                     | 252                                            | 188                             | 330                            | 292                                    |
| Gain.....                         | 10                               | 16                                      | 6                                              | * 4                             | 24                             | 12                                     |
| September 3.....                  | 338                              | 354                                     | 256                                            | 181                             | 354                            | 322                                    |
| Gain.....                         | 24                               | 32                                      | 4                                              | * 7                             | 24                             | 30                                     |
| September 10.....                 | 364                              | 366                                     | 260                                            | 184                             | 373                            | 340                                    |
| Gain.....                         | 26                               | 12                                      | 4                                              | 3                               | 19                             | 18                                     |
| September 17.....                 | 382                              | 400                                     | 266                                            | 180                             | 390                            | 358                                    |
| Gain.....                         | 18                               | 34                                      | 6                                              | * 4                             | 17                             | 18                                     |
| † Average, Sept. 24, 25, and 26   | 399                              | 416                                     | 272                                            | 184                             | 418                            | 386                                    |
| Gain.....                         | 17                               | 16                                      | 6                                              | 4                               | 28                             | 28                                     |
| Gain since June 27.....           | 243                              | 263                                     | 63                                             | *48                             | 270                            | 240                                    |
| October 1.....                    | 413                              | 423                                     | 306                                            | 217                             | 442                            | 412                                    |
| Gain.....                         | 14                               | 7                                       | 34                                             | 33                              | 24                             | 26                                     |
| October 8.....                    | 436                              | 450                                     | 328                                            | 234                             | 458                            | 424                                    |
| Gain.....                         | 23                               | 27                                      | 22                                             | 17                              | 16                             | 12                                     |
| October 15.....                   | 442                              | 476                                     | 366                                            | 264                             | 476                            | 440                                    |
| Gain.....                         | 6                                | 26                                      | 38                                             | 30                              | 18                             | 16                                     |
| October 22.....                   | 460                              | 486                                     | 398                                            | 279                             | 508                            | 460                                    |
| Gain.....                         | 18                               | 10                                      | 32                                             | 15                              | 32                             | 20                                     |
| October 29.....                   | 476                              | 512                                     | 434                                            | 308                             | 518                            | 480                                    |
| Gain.....                         | 16                               | 26                                      | 36                                             | 29                              | 10                             | 20                                     |
| November 5.....                   | 490                              | 522                                     | 454                                            | 330                             | 540                            | 492                                    |
| Gain.....                         | 14                               | 10                                      | 20                                             | 22                              | 22                             | 12                                     |
| November 12.....                  | 504                              | 532                                     | 482                                            | 358                             | 556                            | 508                                    |
| Gain.....                         | 14                               | 10                                      | 28                                             | 28                              | 16                             | 16                                     |
| November 19.....                  | 510                              | 558                                     | 516                                            | 392                             | 572                            | 518                                    |
| Gain.....                         | 6                                | 26                                      | 34                                             | 34                              | 16                             | 10                                     |
| November 26.....                  | 520                              | 576                                     | 526                                            | 414                             | 602                            | 533                                    |
| Gain.....                         | 10                               | 18                                      | 10                                             | 22                              | 30                             | 15                                     |
| Average Dec. 3, 4, and 5.....     | 534                              | 587                                     | 568                                            | 453                             | 615                            | 558                                    |
| Gain.....                         | 14                               | 11                                      | 42                                             | 39                              | 13                             | 25                                     |
| Gain June 27 to Dec. 5.....       | 378                              | 434                                     | 359                                            | 221                             | 467                            | 411                                    |
| Average gain per pig per day..... | 1.17                             | 1.35                                    | 1.11                                           | .69                             | 1.45                           | 1.28                                   |

\* Loss.

† After Sept. 26, all lots were fed same on full ration of grain without grass

Table I shows that there was a gain of all the lots on full feed throughout the experiment, though the gains of all are somewhat irregular. At the beginning lot 3, on one-fourth grain ration, shows a loss at two different weighings. The lot 4, fed on grass without grain, shows losses most of the time amounting to more than a quarter of a pound per day for each pig during the entire time. The lot 5, fed full grain ration without grass in the yards, shows the greatest gain, while the lot 2, fed full grain ration in pens with grass, comes second. One thing special in table I is that the lot fed grass in the yard did not do so well as the lot without grass; while with the lots in the pens the reverse is true.

Table II gives the same matter for the lots at pasture that table I gives for the others.



TABLE II.

Weights of pigs fed in pasture.

| 1894.                        | Lot 7.<br>Fed grain in<br>moveable pen in<br>pasture. | Lot 8.<br>Full ration of<br>grain on pasture. | Lot 9.<br>Three fourths<br>grain ration on<br>pasture. | Lot 10.<br>One half grain<br>ration on pasture | Lot 11.<br>One fourth<br>grain ration on<br>pasture. | Lot 12.<br>On pasture<br>without grain. |
|------------------------------|-------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------|
| Average June 25, 26, and 27. | 147                                                   | 149                                           | 175                                                    | 187                                            | 197                                                  | 225                                     |
| July 2                       | 154                                                   | 166                                           | 184                                                    | 192                                            | 192                                                  | 220                                     |
| Gain                         | 7                                                     | 17                                            | 9                                                      | 5                                              | * 5                                                  | * 5                                     |
| July 9                       | 168                                                   | 188                                           | 198                                                    | 200                                            | 202                                                  | 228                                     |
| Gain                         | 14                                                    | 22                                            | 14                                                     | 8                                              | 10                                                   | 8                                       |
| July 16                      | 180                                                   | 204                                           | 210                                                    | 208                                            | 204                                                  | 218                                     |
| Gain                         | 12                                                    | 16                                            | 12                                                     | 8                                              | 2                                                    | * 10                                    |
| July 23                      | 194                                                   | 228                                           | 228                                                    | 224                                            | 218                                                  | 226                                     |
| Gain                         | 14                                                    | 24                                            | 18                                                     | 16                                             | 14                                                   | 8                                       |
| July 30                      | 212                                                   | 242                                           | 236                                                    | 224                                            | 216                                                  | 236                                     |
| Gain                         | 18                                                    | 14                                            | 8                                                      | 0                                              | * 2                                                  | 10                                      |
| August 6                     | 228                                                   | 266                                           | 254                                                    | 242                                            | 232                                                  | 236                                     |
| Gain                         | 16                                                    | 24                                            | 18                                                     | 18                                             | 16                                                   | 0                                       |
| August 13                    | 238                                                   | 300                                           | 274                                                    | 252                                            | 240                                                  | 242                                     |
| Gain                         | 10                                                    | 34                                            | 20                                                     | 10                                             | 8                                                    | 6                                       |
| August 20                    | 260                                                   | 316                                           | 296                                                    | 268                                            | 250                                                  | † 177                                   |
| Gain                         | 22                                                    | 16                                            | 22                                                     | 16                                             | 10                                                   | †                                       |
| August 27                    | 276                                                   | 336                                           | 310                                                    | 283                                            | 262                                                  | 192                                     |
| Gain                         | 16                                                    | 20                                            | 14                                                     | 15                                             | 12                                                   | 15                                      |
| September 3                  | 294                                                   | 370                                           | 332                                                    | 300                                            | 272                                                  | 190                                     |
| Gain                         | 18                                                    | 34                                            | 22                                                     | 17                                             | 10                                                   | * 2                                     |
| September 10                 | 320                                                   | 390                                           | 352                                                    | 314                                            | 282                                                  | 200                                     |
| Gain                         | 26                                                    | 20                                            | 20                                                     | 14                                             | 10                                                   | 10                                      |
| September 17                 | 346                                                   | 420                                           | 376                                                    | 322                                            | 296                                                  | 206                                     |
| Gain                         | 26                                                    | 30                                            | 24                                                     | 8                                              | 14                                                   | 6                                       |
| ‡ Sept. 24, 25, and 26       | 358                                                   | 449                                           | 399                                                    | 342                                            | 308                                                  | 217                                     |
| Gain since June 27           | 211                                                   | 300                                           | 224                                                    | 155                                            | 111                                                  | 58                                      |
| Gain                         | 12                                                    | 29                                            | 23                                                     | 20                                             | 12                                                   | 11                                      |
| October 1                    | 386                                                   | 470                                           | 427                                                    | 378                                            | 353                                                  | 251                                     |
| Gain                         | 28                                                    | 21                                            | 28                                                     | 36                                             | 45                                                   | 34                                      |
| October 8                    | 416                                                   | 492                                           | 444                                                    | 396                                            | 380                                                  | 282                                     |
| Gain                         | 30                                                    | 22                                            | 17                                                     | 18                                             | 27                                                   | 31                                      |
| October 15                   | 436                                                   | 518                                           | 462                                                    | 420                                            | 398                                                  | 300                                     |
| Gain                         | 20                                                    | 26                                            | 18                                                     | 24                                             | 18                                                   | 18                                      |
| October 22                   | 446                                                   | 532                                           | 486                                                    | 440                                            | 424                                                  | 330                                     |
| Gain                         | 10                                                    | 14                                            | 24                                                     | 20                                             | 26                                                   | 30                                      |
| October 29                   | 466                                                   | 544                                           | 510                                                    | 466                                            | 460                                                  | 360                                     |
| Gain                         | 20                                                    | 12                                            | 24                                                     | 26                                             | 36                                                   | 30                                      |
| November 5                   | 476                                                   | 546                                           | 532                                                    | 484                                            | 468                                                  | 382                                     |
| Gain                         | 10                                                    | 2                                             | 22                                                     | 18                                             | 8                                                    | 22                                      |
| November 12                  | 506                                                   | 560                                           | 554                                                    | 502                                            | 497                                                  | 408                                     |
| Gain                         | 30                                                    | 14                                            | 22                                                     | 18                                             | 29                                                   | 26                                      |
| November 19                  | 538                                                   | 590                                           | 582                                                    | 532                                            | 530                                                  | 440                                     |
| Gain                         | 32                                                    | 30                                            | 28                                                     | 30                                             | 33                                                   | 32                                      |
| November 26                  | 544                                                   | 618                                           | 607                                                    | 558                                            | 549                                                  | 468                                     |
| Gain                         | 6                                                     | 28                                            | 25                                                     | 26                                             | 19                                                   | 28                                      |
| Average Dec. 3, 4, and 5     | 581                                                   | 627                                           | 626                                                    | 581                                            | 582                                                  | 492                                     |
| Gain                         | 37                                                    | 9                                             | 19                                                     | 23                                             | 33                                                   | 24                                      |
| Gain June 27 to Dec. 5       | 434                                                   | 478                                           | 451                                                    | 394                                            | 385                                                  | 330                                     |
| Average gain per pig per day | 1.35                                                  | 1.48                                          | 1.40                                                   | 1.22                                           | 1.19                                                 | 1.02                                    |

\* Loss.

† On August 20, a sow of lot 12 was taken out of the experiment on account of being heavy with pig and another one substituted.

‡ After Sept. 26, all lots were fed alike, loose in the pasture on full grain ration.

Table II shows a steady gain of the lots on full feed for the whole period, though the gains are somewhat irregular. The lot on the one fourth ration and the lot without grain show a loss at some of the weighings. The table also shows that the lot loose in the pasture on full grain ration made the best gain, and that the gain of the lots is less as the grain fed becomes less. This indicates that the grass in no wise compensated for the lack of grain. The table shows further that the lot fed but three-fourths grain ration loose in the pasture gained more than the lot fed a full grain ration in the moveable pen in the pasture.

As a rule, those that gain the most eat the most, so that the rapidity of gain is not always a true measure of the profitable growth. In table III, the food consumed is given for the lots fed in the pens and yard.

TABLE III.  
Food eaten by the lots in pens and yards.

| 1894.                                                     |            | Lot 1.                        | Lot 2.                                    | Lot 3.                                          | Lot 4.                            | Lot 5.                         | Lot 6.                                     |
|-----------------------------------------------------------|------------|-------------------------------|-------------------------------------------|-------------------------------------------------|-----------------------------------|--------------------------------|--------------------------------------------|
|                                                           |            | Fed full grain ration in pen. | † Fed grass and full grain ration in pen. | † Fed grass and one fourth grain ration in pen. | † Fed grass without grain in pen. | Fed full grain ration in yard. | † Fed grass and full grain ration in yard. |
| From June 27, to Sept. 26.                                | Barley ..  | 571.75                        | 574.74                                    | 147.48                                          |                                   | 595.24                         | 563.24                                     |
|                                                           | Bran ....  | 571.75                        | 574.74                                    | 147.48                                          |                                   | 595.24                         | 563.24                                     |
|                                                           | Grass....  |                               | 220.50                                    | 862.00                                          | 1208.00                           |                                | 231.00                                     |
| From Sept. 26 to Oct. 29.                                 | Barley ..  | 226.87                        | 246.99                                    | 303.24                                          | 235.75                            | 259.75                         | 241.74                                     |
|                                                           | Bran ....  | 226.87                        | 246.99                                    | 303.24                                          | 235.75                            | 259.75                         | 241.74                                     |
|                                                           | Grass....  |                               |                                           |                                                 |                                   |                                |                                            |
| From Oct. 29, to Dec. 5.                                  | Wheat....  | 231.25                        | 256.75                                    | 390.75                                          | 353.75                            | 307.00                         | 279.00                                     |
|                                                           | Corn.....  | 231.25                        | 256.75                                    | 390.75                                          | 353.75                            | 307.00                         | 279.00                                     |
|                                                           | Grass....  |                               |                                           |                                                 |                                   |                                |                                            |
| From June 27, to Dec. 5.                                  | Barley ..  | 798.62                        | 821.73                                    | 450.72                                          | 235.75                            | 854.99                         | 804.98                                     |
|                                                           | Bran ....  | 798.62                        | 821.73                                    | 450.72                                          | 235.75                            | 854.99                         | 804.98                                     |
|                                                           | Grass....  |                               | 220.50                                    | 862.00                                          | 1208.00                           |                                | 231.00                                     |
|                                                           | Wheat, ... | 231.25                        | 256.75                                    | 390.75                                          | 353.75                            | 307.00                         | 279.00                                     |
|                                                           | Corn ..... | 231.25                        | 256.75                                    | 390.75                                          | 353.75                            | 307.00                         | 279.00                                     |
| Total, June 27 to September 26.....                       |            | 1143.50                       | 1226.65*                                  | 596.66                                          | 422.80*                           | 1190.48                        | 1207.33*                                   |
| Total, September 26 to October 29....                     |            | 453.74                        | 493.98                                    | 606.48                                          | 471.50                            | 519.50                         | 483.48                                     |
| Total, October 29 to December 5.....                      |            | 462.50                        | 513.50                                    | 781.50                                          | 707.50                            | 614.00                         | 558.00                                     |
| Total, June 27 to December 5 .....                        |            | 2059.74                       | 2234.13*                                  | 1984.64*                                        | 1601.80*                          | 2323.98                        | 2248.81*                                   |
| Average per pig per day, June 27 to September 26 .....    |            | 6.28                          | 6.74                                      | 3.28                                            | 2.32*                             | 6.54                           | 6.63*                                      |
| Average per pig per day, September 26 to December 5 ..... |            | 6.54                          | 7.20                                      | 9.91                                            | 8.42                              | 8.09                           | 7.44                                       |
| Average per pig per day, June 27 to December 5 .....      |            | 6.39                          | 6.94                                      | 6.16*                                           | 4.97*                             | 7.22                           | 6.99*                                      |

\* Grass reduced to 10 per cent. moisture.

† Fed full ration of grain without grass after Sept. 26.

As will be seen table III is divided into periods. The first period covers the time that the different rations were

fed. The second period covers the time that all the pigs were on a full grain ration of barley and bran. The third period covers the time that the grain was composed of wheat and corn.

In reckoning the total amount of food, the grass is reduced to 10 per cent. moisture. It is assumed that in 100 pounds of grass there is 35 pounds of food equal in moisture to the grain.

From table III it will be seen that the lot fed grain and grass in the pen ate the most during the first period. This amount was, however, only 19.3 pounds more than those fed similarly in the yard. For the subsequent periods the pigs which had been fed on part rations ate much more than the others. The totals for the entire time show that those fed only part rations at first ate nearly as much as those on full ration for the whole period.

Table IV gives the same matter for the lots at pasture that table III gives for those fed in the pens and yard.

TABLE IV.  
Food eaten by lots in pasture.

| 1894.                                        |                            | †Lot 7.                              | Lot 8.                           | *Lot 9.                                   | *Lot 10                              | *Lot 11                                | *Lot 12                   |
|----------------------------------------------|----------------------------|--------------------------------------|----------------------------------|-------------------------------------------|--------------------------------------|----------------------------------------|---------------------------|
|                                              |                            | Fed grain in movable pen in pasture. | Full ration of grain in pasture. | Three fourths ration of grain in pasture. | One half ration of grain in pasture. | One fourth ration of grain in pasture. | On pasture without grain. |
| From June 27 to Sept. 26                     | Barley ...                 | 588.24                               | 637.74                           | 476.86                                    | 323.11                               | 161.37                                 |                           |
|                                              | Bran ...                   | 588.24                               | 637.74                           | 476.86                                    | 323.11                               | 161.37                                 |                           |
| From Sept. 26 to Oct. 29                     | Barley ...                 | 250.00                               | 255.24                           | 287.12                                    | 290.25                               | 309.25                                 | 267.75                    |
|                                              | Bran ...                   | 250.00                               | 255.24                           | 287.12                                    | 290.25                               | 309.25                                 | 267.75                    |
| From Oct 29 to Dec. 5.                       | Wheat ...                  | 306.12                               | 259.00                           | 362.75                                    | 341.75                               | 367.50                                 | 334.50                    |
|                                              | Corn ...                   | 306.12                               | 259.00                           | 362.75                                    | 341.75                               | 367.50                                 | 334.50                    |
|                                              | Barley ...                 | 838.24                               | 893.08                           | 763.98                                    | 613.36                               | 470.62                                 | 267.75                    |
|                                              | Bran ...                   | 833.24                               | 893.08                           | 763.68                                    | 613.36                               | 470.62                                 | 267.75                    |
| From June 27 to Dec. 5.                      | Wheat ...                  | 306.12                               | 259.00                           | 362.75                                    | 341.75                               | 367.50                                 | 334.50                    |
|                                              | Corn ...                   | 306.12                               | 259.00                           | 362.75                                    | 341.75                               | 367.50                                 | 334.50                    |
|                                              | Total, June 27 to Sept. 26 | 1176.48                              | 1275.48                          | 953.72                                    | 646.22                               | 322.74                                 |                           |
|                                              | “ Sept 26 to October 29    | 500.00                               | 510.48                           | 574.24                                    | 580.50                               | 618.50                                 | 535.50                    |
| “ Oct. 29 to Dec. 5                          | 612.24                     | 518.00                               | 725.50                           | 683.50                                    | 735.00                               | 669.00                                 |                           |
| “ June 27 to Dec. 5                          | 2288.72                    | 2303.96                              | 2253.46                          | 1910.22                                   | 1676.24                              | 1204.50                                |                           |
| Average per pig per day, June 27 to Sept. 26 |                            | 6.46                                 | 7.00                             | 5.24                                      | 3.55                                 | 1.77                                   |                           |
| Average per pig per day, Sept. 26 to Dec. 5  |                            | 7.94                                 | 7.34                             | 9.27                                      | 9.03                                 | 9.67                                   | 8.60                      |
| Average per pig per day, June 27 to Dec. 5   |                            | 7.11                                 | 7.15                             | 6.99                                      | 5.93                                 | 5.20                                   | 3.73                      |

\* Fed full grain ration after September 26.

† Allowed to run loose in pasture after September 26.

Table IV shows that each pig running loose ate a little over half a pound of grain per day more than did those confined in the movable pen during their period of confinement. For the subsequent period, however, while lot 7 was allowed the freedom of the pasture, the case is reversed; so that for the whole period there is but little difference in the amount eaten by the two lots, this fact showing strongly the effects of exercise on appetite. Another significant fact shown by the table is the enormous amount eaten, after being put on full feed, by lots 9, 10, 11, and 12, which had had only part rations till Sept 26. Lot 8 ate but 2.5 per cent of the live weight per day, while lot 11 ate 4.3 per cent during the period from September 26 to December 5. Taken as a whole, then, it would seem that if a hog is deprived of a part of the food he would eat under the most favorable conditions, by lack of appetite or otherwise, he will, when put under these favorable conditions, eat much more for a considerable period than he otherwise would have eaten.

From the preceding tables, it is plain that the economical side of the question must be studied by a comparison of the food required for one pound of gain. Table V gives this and other matter for the first six lots by periods.

TABLE V.

Lots in pens and yards.

|                                                                                          | Lot 1                         | Lot 2                                     | Lot 3                                           | Lot 4                              | Lot 5                          | Lot 6                                      |
|------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------|-------------------------------------------------|------------------------------------|--------------------------------|--------------------------------------------|
| 1894.                                                                                    | Fed full grain ration in pen. | * Fed grass and full grain ration in pen. | * Fed grass and one fourth grain ration in pen. | * Fed grass without grain in pens. | Fed full grain ration in yard. | * Fed grass and full grain ration in yard. |
| Fed different combinations of barley, bran, and grass, June 27 to September 26 (91 days) |                               |                                           |                                                 |                                    |                                |                                            |
| Average gain per day per pig, lbs.                                                       | 1.33                          | 1.44                                      | .35                                             | †.26                               | 1.48                           | 1.31                                       |
| Average food eaten per day per pig, lbs                                                  | 6.28                          | 6.74                                      | 3.27                                            | 2.31                               | 6.54                           | 6.63                                       |
| Pounds of food for 1 lb. of gain, live weight                                            | 4.70                          | 4.68                                      | 9.34                                            | †                                  | 4.41                           | 5.06                                       |
| Cost of food for 1 lb. of pork, live weight, cts                                         | 3.52                          | 3.32                                      | 4.23                                            | †                                  | 3.31                           | 3.58                                       |
| Fed barley and bran, Sept. 26 to Oct. 29. (33 days.)                                     |                               |                                           |                                                 |                                    |                                |                                            |
| Average gain per day per pig, lbs.                                                       | 1.17                          | 1.45                                      | 2.45                                            | 1.88                               | 1.51                           | 1.42                                       |
| Average food eaten per day per pig, lbs                                                  | 6.87                          | 7.48                                      | 9.18                                            | 7.14                               | 7.87                           | 7.32                                       |
| Pounds of food for one pound of gain, live weight                                        | 5.88                          | 5.15                                      | 3.74                                            | 3.80                               | 5.20                           | 5.15                                       |
| Cost of food for 1 lb. of pork, live weight, cts                                         | 4.41                          | 3.86                                      | 2.80                                            | 2.85                               | 3.90                           | 3.86                                       |
| Fed wheat and corn, Oct. 29 to Dec. 5. (37 days.)                                        |                               |                                           |                                                 |                                    |                                |                                            |
| Average gain per day per pig, lbs.                                                       | .78                           | 1.01                                      | 1.81                                            | 1.96                               | 1.31                           | 1.05                                       |
| Average food eaten per day per pig, lbs                                                  | 6.25                          | 6.94                                      | 10.56                                           | 9.56                               | 8.30                           | 7.54                                       |
| Pounds of food for 1 lb. of gain, live weight                                            | 8.00                          | 6.86                                      | 5.84                                            | 4.88                               | 6.33                           | 7.16                                       |
| Cost of food for one lb. of pork, live weight, cts                                       | 5.33                          | 4.57                                      | 3.89                                            | 3.25                               | 4.22                           | 4.77                                       |
| Fed barley, bran, wheat, and corn without grass. Sept. 26 to Dec. 5. (70 days.)          |                               |                                           |                                                 |                                    |                                |                                            |
| Average gain per day per pig, lbs.                                                       | .96                           | 1.22                                      | 2.11                                            | 1.92                               | 1.41                           | 1.23                                       |
| Average food eaten per day per pig, lbs                                                  | 6.54                          | 7.20                                      | 9.91                                            | 8.42                               | 8.10                           | 7.44                                       |
| Pounds of food for 1 lb. of gain, live weight                                            | 6.80                          | 5.90                                      | 4.69                                            | 4.38                               | 5.74                           | 6.05                                       |
| Cost of food for one lb. of pork, live weight, cts                                       | 4.87                          | 4.21                                      | 3.34                                            | 3.05                               | 4.06                           | 4.31                                       |
| Summary of whole feeding. June 27 to Dec. 5. (161 days.)                                 |                               |                                           |                                                 |                                    |                                |                                            |
| Average gain per day per pig, lbs.                                                       | 1.17                          | 1.35                                      | 1.11                                            | .69                                | 1.45                           | 1.28                                       |
| Average food eaten per day per pig, lbs                                                  | 6.40                          | 6.94                                      | 6.16                                            | 4.96                               | 7.22                           | 6.98                                       |
| Pounds of food for one lb. of gain, live weight                                          | 5.47                          | 5.14                                      | 5.55                                            | 7.19                               | 4.98                           | 5.45                                       |
| Cost of food for one lb. of pork, live weight, cts                                       | 3.98                          | 3.65                                      | 3.47                                            | 4.01                               | 3.62                           | 3.86                                       |

All fed full grain ration without grass after September 26.

Ground Barley \$1.00 per cwt.

Wheat bran 50 cents per cwt.

Ground Wheat 40 cents per bushel, or 66½ cents per cwt.

Ground Corn 66½ cents per cwt.

Grass (35 pounds, dry, to the hundred) \$3.00 per ton.

\* Grass reduced to 10 per cent moisture.

† Loss.

Table V not only gives the gains, the food eaten, and the pounds of food required for a pound of gain, but it also

gives the cost. The prices given were prices actually paid for the grain excepting the corn, which is always rated here at about the same price as wheat. The grass is given a value that it would have if it were dry hay, the assumption being made that 100 pounds of grass would contain 35 pounds of dried hay.

From table V we ascertain that while the grass was being fed, June 27 to September 26, the pigs fed the grain without grass in the yard made the most rapid gain, requiring the least food for one pound of gain, and so made the best use of the food. Those fed grass and a full grain ration in the pens come next, while the other two lots fed the full grain ration are about equal. One striking fact of table V is that lot 3, which received one-fourth the amount of grain that lot two received, gained just about one fourth as much as did lot 2. After September 26, in order to study the after effects of the different systems of feeding, the grass fed lots were given no more and all were put on full grain ration. For 33 days they were fed bran and barley, then changed to corn and wheat to finish on. The pigs that had received the part grain rations, ate enormously of the grain after being put on full feed. They also made enormous gains—the average of both lots for 70 days being a little more than two pounds per day to the pig. The two pigs of lot 4 gained 147.7 pounds each in the 70 days. Lot 1 began to show signs of “ripening” during this period, and though they ate more they fell off in rate of gain, thus increasing the amount of food necessary for one pound of gain by about 50 per cent. Though not so heavy as the pigs of lot 2 they were apparently much more matured. Lot 2 fell off somewhat in the rate of gain, but less so than lot 1, showing that they carried their excess weight much better than did lot 1. It is believed that the addition of grass to the ration kept the pigs in a better growing condition than did the grain alone.

A summary of the whole shows that those in the yard without grass, ate the most and made the most rapid gain,

but required the least food for one pound of increase in live weight. It also seems to show that the grass fed to the lot in the yard was a positive detriment. Of the two pen lots, that which received the grass (lot 2) did the better. One striking fact shown by the summary, is that lot 3, after receiving the full grain ration, made such rapid gains on lot 2 that the food required for a pound of gain is nearly the same with both lots for the whole period.

The cost is put in for reference and cannot in any way be used as a basis of comparisons. For instance, lots 2 and 3 required about the same amount of food for one pound of growth, but the cost of the food of lot 3 is less than that of lot 2. This is due to the fact that lot 3 ate a large portion of its food from the wheat and corn—it being a better and at the same time a cheaper food.

Table VI gives matter for the lots at pasture similar to that given by table V for the lots in the yards and hog house.

TABLE VI.  
Lots at pasture.

| 1894.                                                                        | Lot 7<br>Fed grain in<br>movable pen in<br>pasture. | Lot 8<br>Full ration of<br>grain on pasture | Lot 9<br>Three fourths<br>grain ration on<br>pasture. | Lot 10<br>One half grain<br>ration on pas-<br>ture. | Lot 11<br>One fourth<br>grain ration on<br>pasture. | Lot 12<br>On pasture<br>without grain. |
|------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|----------------------------------------|
| Fed different amounts of barley and bran. June 27 to September 27 (91 days.) |                                                     |                                             |                                                       |                                                     |                                                     |                                        |
| Average gain per day per pig, lbs.                                           | 1.16                                                | 1.65                                        | 1.23                                                  | .85                                                 | .61                                                 | .34                                    |
| Average grain eaten per day per pig, pounds                                  | 6.46                                                | 7.00                                        | 5.24                                                  | 3.55                                                | 1.77                                                |                                        |
| Pounds of grain for one lb. of gain, live weight                             | 5.57                                                | 4.23                                        | 4.25                                                  | 4.16                                                | 2.90                                                |                                        |
| Cost of grain and pasture for one lb. of pork, live weight, cts.             | 4.29                                                | 3.29                                        | 3.38                                                  | 3.70                                                | 3.39                                                | 3.27                                   |
| Fed barley and bran, all loose in pasture. Sept. 26 to Oct. 29. (33 days.)   |                                                     |                                             |                                                       |                                                     |                                                     |                                        |
| Average gain per day per pig, lbs.                                           | 1.64                                                | 1.44                                        | 1.68                                                  | 1.88                                                | 2.30                                                | 2.17                                   |
| Average grain eaten per day per pig, lbs.                                    | 7.57                                                | 7.73                                        | 8.70                                                  | 8.79                                                | 9.37                                                | 8.11                                   |
| Pounds of grain for one lb. of gain, live weight                             | 4.62                                                | 5.37                                        | 5.17                                                  | 4.68                                                | 4.07                                                | 3.74                                   |
| Cost of grain and pasture for one lb. of pork, live weight, cts.             | 3.59                                                | 4.15                                        | 4.00                                                  | 3.62                                                | 3.14                                                | 2.90                                   |
| Fed wheat and corn. Oct 29 to Dec. 5. (37 days.)                             |                                                     |                                             |                                                       |                                                     |                                                     |                                        |
| Average gain per day per pig, lbs.                                           | 1.55                                                | 1.12                                        | 1.57                                                  | 1.55                                                | 1.65                                                | 1.78                                   |
| Average grain eaten per day per pig, pounds                                  | 8.27                                                | 7.00                                        | 9.80                                                  | 9.24                                                | 9.93                                                | 9.04                                   |
| Pounds of grain for one lb. of gain, live weight                             | 5.32                                                | 6.24                                        | 6.25                                                  | 5.95                                                | 6.02                                                | 5.07                                   |
| Cost of grain and pasture for one lb. of pork, live weight, cts.             | 3.66                                                | 4.32                                        | 4.28                                                  | 4.08                                                | 4.12                                                | 3.48                                   |
| Summary of whole period. June 27 to Dec. 5. (161 days.)                      |                                                     |                                             |                                                       |                                                     |                                                     |                                        |
| Average gain per day per pig, lbs.                                           | 1.35                                                | 1.48                                        | 1.40                                                  | 1.22                                                | 1.19                                                | 1.02                                   |
| Average grain eaten per day per pig, pounds                                  | 7.11                                                | 7.15                                        | 7.00                                                  | 5.93                                                | 5.20                                                | 3.74                                   |
| Pounds of grain for one lb. of gain, live weight                             | 5.27                                                | 4.82                                        | 5.00                                                  | 4.85                                                | 4.36                                                | 3.65                                   |
| Cost of grain and pasture for one lb. of pork, live weight, cts.             | 3.98                                                | 3.66                                        | 3.77                                                  | 3.78                                                | 3.52                                                | 3.19                                   |

All fed full grain ration loose in pasture after Sept. 26.

Grain charged for as in table V.

Pasture: Those on full grain ration 6 cents a month for each pig; those on three fourths grain ration 7½ cents per month; those on one-half grain ration 15 cents per month; those on one-fourth grain ration 22½ cents per month; those without grain 30 cents per month.

Table VI shows that while the lots were fed as indicated, to September 26, the lot on the full grain ration and loose in the pasture did the best of all. They ate the most and gained most rapidly. The lot 7, in the movable pen did poorly as compared with the others. They gained less on a full grain ration than did lot 9 on a three-fourths



grain ration. The relative gains of the lots on grain in the pens, varied as the grain fed, while with those at pasture this is not true; those receiving the one-fourth grain ration gained more than one-fourth as much as those on the full ration. Those with the three-fourths and one-half grain ration gained respectively just about three-fourths and one-half as much as those on the full ration. The grass, then, that was eaten by these lots 9 and 10, was simply lost.

It is assumed that one acre of good pasture, such as that used in these trials, will carry ten pigs without grain for the season, and fifty pigs on full grain ration; and it is believed that this assumption is very near the truth. Such a pasture, however, would cut from four to five tons of cured hay. It is also assumed that such a pasture would be worth \$3.00 per month, per acre, and this forms the basis of the cost of pasture. Upon the foregoing basis, it appears that it is more profitable to feed either a full grain ration or none at all; the half grain ration shows the poorest result of the lot.

The subsequent feeding shows that lot 8 gained least of all the lots. It also shows what enormous amounts were eaten by the lots that had been on part rations.

The summary of the whole period shows that lot 8 gained the most and ate the most, and required less grain for a pound of growth than did lots 7, 9, and 10. This again brings out the fact that the confinement of lot 7 was detrimental, and that the grass fed to lots 9 and 10 was entirely wasted.

The cost of one pound of gain is given. Many farmers use the lucerne field as a sort of balance wheel. When grain is high during June, July, and August, the pigs are made to subsist on pasture, and are afterward fed heavily on cheap grain. From this point of view the costs given in table VI can be compared—though they cannot be compared otherwise.

In table VII the lots are arranged in groups according to the feed or treatment given for the two periods, the first group shows the results during the time that the part grain

rations were being fed; and the second the results during the time that all received the full grain ration.

TABLE VII.

Arranged in groups according to different rations fed.

| 1894.                                                             |                           | Average per pig per day. |             | Pounds of food for one lb. of gain live weight. | Cost of grain for one lb. of pork, live weight, cts. |
|-------------------------------------------------------------------|---------------------------|--------------------------|-------------|-------------------------------------------------|------------------------------------------------------|
|                                                                   |                           | Gain                     | Grain eaten |                                                 |                                                      |
| June 27 to September 26. (91 days.)                               |                           |                          |             |                                                 |                                                      |
| Fed full grain ration without grass.                              | In pen .....              | 1.33                     | 6.28        | 4.70                                            | 3.52                                                 |
|                                                                   | In yard .....             | 1.48                     | 6.54        | 4.41                                            | 3.31                                                 |
|                                                                   | Average .....             | 1.39                     | 6.41        | 4.55                                            | 3.41                                                 |
| Fed full grain ration with grass.                                 | In pen .....              | 1.44                     | 6.32        | 4.37                                            | 3.28                                                 |
|                                                                   | In yard .....             | 1.31                     | 6.19        | 4.71                                            | 3.53                                                 |
|                                                                   | In movable pen in pasture | 1.16                     | 6.46        | 5.57                                            | 4.18                                                 |
|                                                                   | Loose in pasture .....    | 1.65                     | 7.00        | 4.23                                            | 3.17                                                 |
| Average .....                                                     | 1.39                      | 6.49                     | 4.72        | 3.54                                            |                                                      |
| Fed three-fourths grain ration with grass. Loose in pasture ..... |                           | 1.23                     | 5.24        | 4.25                                            | 3.19                                                 |
| Fed one-half grain ration with grass. Loose in pasture .....      |                           | .85                      | 3.55        | 4.16                                            | 3.12                                                 |
| Fed one-fourth grain ration with grass.                           | In pen .....              | .35                      | 1.62        | 4.63                                            | 3.51                                                 |
|                                                                   | Loose in pasture .....    | .61                      | 1.77        | 2.90                                            | 2.18                                                 |
|                                                                   | Average .....             | .48                      | 1.69        | 3.76                                            | 2.84                                                 |
| Grass without grain.                                              | In pen .....              | *.26                     |             |                                                 |                                                      |
|                                                                   | Loose in pasture .....    | .37                      |             |                                                 |                                                      |
|                                                                   | Average .....             | .11                      |             |                                                 |                                                      |
| All fed full grain ration. September 26 to Dec. 5. (70 days.)     |                           |                          |             |                                                 |                                                      |
| Fed previous to Sept 26: Full grain ration without grass.         | In pen .....              | .96                      | 6.54        | 6.80                                            | 4.80                                                 |
|                                                                   | In yard .....             | 1.41                     | 8.10        | 5.75                                            | 4.05                                                 |
|                                                                   | Average .....             | 1.18                     | 7.32        | 6.27                                            | 4.42                                                 |
| Full grain ration with grass .....                                | In pen .....              | 1.22                     | 7.20        | 5.89                                            | 4.17                                                 |
|                                                                   | In yard .....             | 1.23                     | 7.44        | 6.05                                            | 4.26                                                 |
|                                                                   | In movable pen in pasture | 1.59                     | 7.94        | 4.99                                            | 3.51                                                 |
|                                                                   | Loose in pasture .....    | 1.27                     | 7.35        | 5.78                                            | 4.09                                                 |
| Average .....                                                     | 1.33                      | 7.48                     | 5.68        | 4.00                                            |                                                      |
| Three-fourths grain ration with grass. Loose in pasture .....     |                           | 1.62                     | 9.28        | 5.72                                            | 4.03                                                 |
| One-half grain ration with grass. Loose in pasture .....          | In pen .....              | 1.71                     | 9.03        | 5.29                                            | 3.73                                                 |
|                                                                   | In yard .....             | 2.11                     | 9.91        | 4.69                                            | 3.30                                                 |
|                                                                   | Loose in pasture .....    | 1.96                     | 9.67        | 4.94                                            | 3.48                                                 |
| Average .....                                                     | 2.03                      | 9.79                     | 4.81        | 3.39                                            |                                                      |
| One-fourth grain ration with grass.                               | In pen .....              | 1.92                     | 8.42        | 4.38                                            | 3.07                                                 |
|                                                                   | Loose in pasture .....    | 1.96                     | 8.60        | 4.39                                            | 3.12                                                 |
|                                                                   | Average .....             | 1.94                     | 8.51        | 4.39                                            | 3.09                                                 |

\* Loss.

Table VII shows that, for the first period, the average gains of those fed the full grain ration are equal, whether

with or without the grass. It also shows that those fed grass not only ate the extra amount of food in the grass, but ate more grain than did those without the grass. It is therefore seen that the grass was not only of no consequence but seemed to be detrimental to economy in producing gain. A comparison of the lots in the pens and yards, indicates about the same amount of grain for a pound of gain, and shows that the grass eaten was of no consequence. With the remainder of the lots, the comparison is favorable to those at pasture, both in rate of gain and in amount of grain required for one pound of gain.

For the subsequent feeding, those which previously had been fed the grass did much better than those fed on grain alone.

Table VIII gives the same data as the previous table, except that it covers the whole feeding period.

TABLE VIII.  
Arranged in groups as in table VII.

| 1894                                                         |                           | Average per pig per day. |             | Pounds of grain for 1 lb. of grain, live wt. | Cost of grain for one pound of pork, live weight. |
|--------------------------------------------------------------|---------------------------|--------------------------|-------------|----------------------------------------------|---------------------------------------------------|
|                                                              |                           | Gain                     | Grain eaten |                                              |                                                   |
| Whole period. June 27 to Dec. 5. (161 days.)                 |                           |                          |             |                                              |                                                   |
| Fed up to Sept. 26:<br>Full grain ration<br>without grass.   | In pen.....               | 1.17                     | 6.40        | 5.47                                         | 3 98                                              |
|                                                              | In yard.....              | 1.45                     | 7.22        | 4.98                                         | 3 62                                              |
|                                                              | Average.....              | 1.31                     | 6.81        | 5.22                                         | 3 80                                              |
| Full grain ration<br>with grass.                             | In pen.....               | 1.35                     | 6.94        | 5.14                                         | 3 62                                              |
|                                                              | In yard.....              | 1.28                     | 6.98        | 5.45                                         | 3 84                                              |
|                                                              | In movable pen in pasture | 1.35                     | 7.11        | 5.27                                         | 3 84                                              |
|                                                              | Loose in pasture.....     | 1.48                     | 7.15        | 4.82                                         | 3 52                                              |
| Average.....                                                 | 1.36                      | 7.04                     | 5.17        | 3 70                                         |                                                   |
| Three-fourths grain ration with grass. Loose in pasture..... |                           | 1.40                     | 7.00        | 5.00                                         | 3 61                                              |
| One-half grain ration with grass. Loose in pasture.....      |                           | 1.22                     | 5.93        | 4 85                                         | 3 49                                              |
| One-fourth grain ration with grass.                          | In pen.....               | 1.11                     | 6.16        | 5 55                                         | 3 33                                              |
|                                                              | Loose in pasture.....     | 1.19                     | 5.20        | 4 36                                         | 3 11                                              |
|                                                              | Average.....              | 1.15                     | 5 68        | 4 95                                         | 3 22                                              |
| Grass without grain.                                         | In pen.....               | .69                      | 4.96        | 7 19                                         | 3 73                                              |
|                                                              | Loose in pasture.....     | 1.02                     | 3.74        | 3 65                                         | 2 57                                              |
|                                                              | Average.....              | .85                      | 4.35        | 5 42                                         | 3 15                                              |

Table VIII shows, for the whole period, that of those fed the full grain ration during the entire time, the aver-

age of the lots on grass gained a little more rapidly and required a little less grain for one pound of growth than those without the grass. In table VIII only the first four lots of the table are strictly comparable in regard to the effects of the grass feeding. The average gain per day of the two lots without grass and of the two lots with grass, is identically the same for the period as a whole. The average amount of grain required for a pound of gain for the two lots without grass is 5.22 lbs. while the average for the two similar lots with the grass is 5.29, thus showing against the grass fed lot.

Table IX is inserted to show, as nearly as possible, the effects of exercise.

TABLE IX.

Arranged to show the effects of exercise.

| 1894-                                                                          | Confined in<br>small pens.                   |               | Having<br>exercise. |                        |
|--------------------------------------------------------------------------------|----------------------------------------------|---------------|---------------------|------------------------|
|                                                                                | In hog<br>house.                             | In<br>past're | Loose<br>in yard    | Loose<br>in<br>past're |
| FIRST PERIOD. June 27 to Sept. 26. (91 days.)                                  |                                              |               |                     |                        |
| Full grain ration<br>without grass.                                            | Gain per pig per day.....                    | 1.33          | 1.48                |                        |
|                                                                                | Grain eaten per pig per day..                | 6.28          | 6.54                |                        |
|                                                                                | Grain requir'd for 1 lb of gain              | 4.70          | 4.41                |                        |
| Full grain ration<br>with grass.                                               | Gain per pig per day.....                    | 1.44          | 1.31                | 1.65                   |
|                                                                                | Grain eaten per pig per day..                | 6.32          | 6.46                | 6.19                   |
|                                                                                | Grain requir'd for 1 lb of gain              | 4.37          | 5.57                | 4.71                   |
| One-fourth grain<br>ration with grass.                                         | Gain per pig per day.....                    | .35           |                     | .61                    |
|                                                                                | Grain eaten per pig per day..                | 1.62          |                     | 1.77                   |
| Fed grass but no grain.                                                        | Grain requir'd for 1 lb of gain              | 4.62          |                     | 2.90                   |
|                                                                                | Gain per pig per day.....                    | *.26          |                     | .37                    |
| SECOND PERIOD. Sept. 26 to Dec. 5. (70 days.)                                  |                                              |               |                     |                        |
| Full grain ration<br>without grass from<br>beginning.                          | Gain per pig per day.....                    | .96           | 1.41                |                        |
|                                                                                | Grain eaten per pig per day..                | 6.54          | 8.10                |                        |
|                                                                                | Grain requir'd for 1 lb of gain              | 6.80          | 5.75                |                        |
| Full grain ration<br>with grass up to<br>Sept. 26. After<br>this date no grass | Gain per pig per day.....                    | 1.22          | 1.23                |                        |
|                                                                                | Grain eaten per pig per day..                | 7.20          | 7.44                |                        |
|                                                                                | Grain required for one pound<br>of gain..... | 5.89          | 6.05                |                        |
| Averages                                                                       | Gain per pig per day.....                    | .87           | 1.13                |                        |
|                                                                                | Grain eaten per pig per day..                | 3.95          | 4.13                |                        |
|                                                                                | Grain requir'd for 1 lb of gain              | 4.55          | 3.65                |                        |

\* Loss.

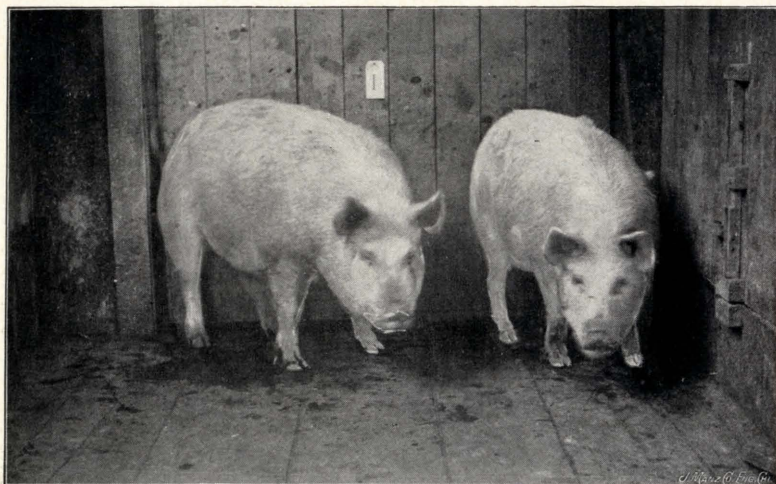
In table IX only such lots are included as can be compared with each other with regard to exercise, that is, where all factors except exercise were the same. In all cases except that of the lot receiving grass in the yard, it is

found that those getting the exercise gained more rapidly, ate more, and required less grain for a pound of growth than did those confined in pens. The averages of all show that those having the exercise gained nearly 30 per cent. faster, ate about 5 per cent. more grain altogether, but required nearly 20 per cent less grain to make a pound of gain than did those without exercise. Of the two lots fed the 91 days on grass alone, it is seen that the lot confined in the pen lost weight, as not enough grass was eaten, while those running at large ate enough of the grass to make some gain. It would appear, however, that the small excess amount eaten by all of those getting the exercise, is not enough to produce the excess in gain made. It seems then, that the exercise is beneficial in improving both appetite and digestion.

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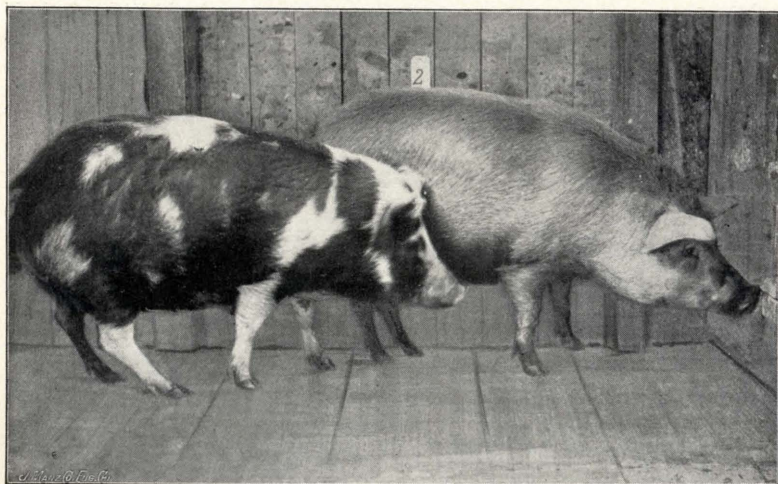
ILLUSTRATIONS.

The cuts represent the pigs of lots 1, 2, 3, and 4 of 1894 and are made from photographs taken on September 26. The pigs of lot 1 fed grain alone show an advanced stage of ripeness that is lacking in the pigs of lot 2, fed grass as well as grain. The pigs in lot 3, fed grass and one-fourth grain ration, appear to be in a thrifty growing condition. The pigs in lot 4, fed grass without grain, look much better in the cut than in life. It may be well to state that the smallest pig of lot 1 and the white pig of lot 4 are from the same litter, and when the experiment was commenced were of about equal size and thriftiness.



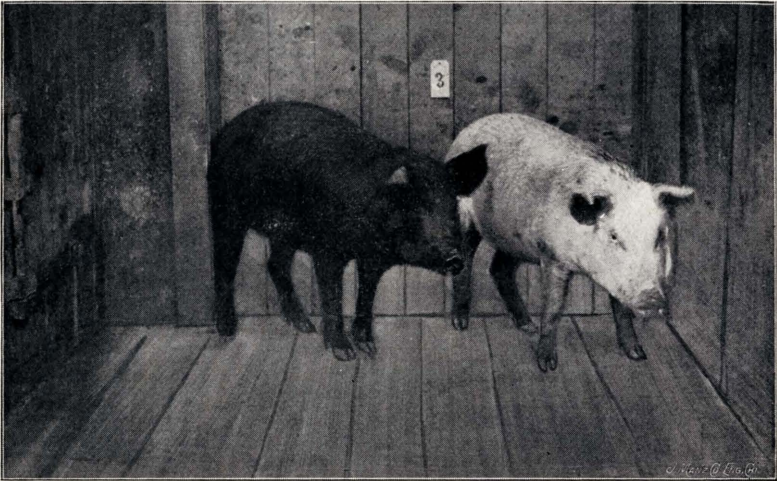
FED 91 DAYS ON FULL GRAIN RATION WITHOUT GRASS.

Average weight at beginning	78.00 lbs.
" " " ending	199.50 "
Average gain	121.50 "



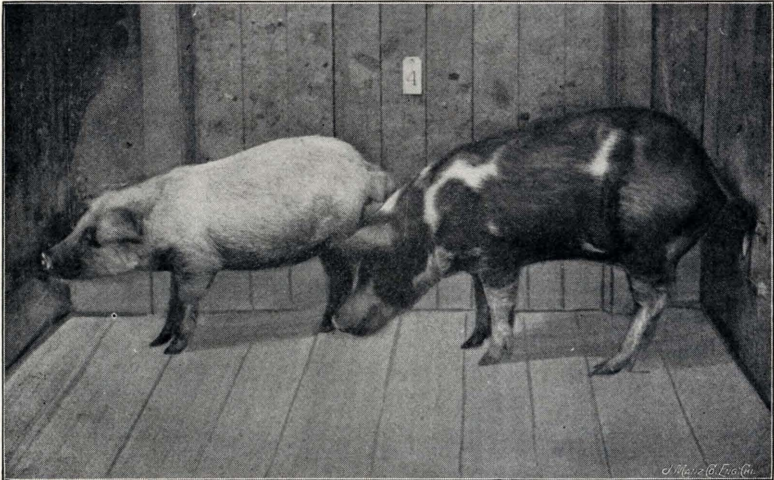
FED 91 DAYS ON FULL GRAIN RATION WITH GRASS.

Average weight at beginning	76.50 lbs.
" " " ending	208.00 "
Average gain	131.50 "



FED 91 DAYS ON ONE-FOURTH GRAIN RATION WITH GRASS.

Average weight at beginning	104.50 lbs.
" " " ending.....	136.00 "
Average gain.....	31.50 "



FED 91 DAYS ON GRASS WITHOUT GRAIN.

Average weight at beginning	116.50 lbs.
" " " ending.....	92.00 "
Average loss.....	24.00 "

RESULTS OF 1895.

This work was carried on again during the summer of 1895. The work is along the line of last year, except that the lot fed grass without grain in the pen was not carried in 1895, nor was the lot in the movable pen in the pasture. Both of these lots did so poorly that it was thought best to leave them out of any further consideration. This leaves but ten lots for 1895. For these ten lots, twenty pigs were used, two in each lot. The animals were bought in Cache valley, and represent about the average of the hogs raised here. The lots by numbers were fed as follows:

- Lot 1. Full grain ration without grass in pen.
- Lot 2. Full grain ration with grass in pen.
- Lot 3. One-fourth grain ration with grass in pen.
- Lot 4. Full grain ration without grass in yard.
- Lot 5. Full grain ration with grass in yard.
- Lot 6. Full grain ration on pasture.
- Lot 7. Three-fourths grain ration on pasture.
- Lot 8. One-half grain ration on pasture.
- Lot 9. One-fourth grain ration on pasture.
- Lot 10. On pasture without grass.

The pigs were fed as above indicated from June 29, to August 28, 1895. After this date, the first five lots received no grass, and all were fed a full grain ration. The last five lots were fed full grain rations after August 28, and were allowed the run of the pasture as before. The experiment ended on October 30, 1895.

For the first two weeks the pigs received wheat bran and ground wheat as the grain ration; after this time no bran could be secured, and the grain was made up wholly of ground wheat. The feed for the pigs in the pens was made into a slop just before feeding, and was fed twice daily. Those loose in the pasture were fed in the same manner, each lot being put into a separate pen for feeding. Lot 3 received just one-fourth as much grain as was fed to lot 2. Lots 7, 8, and 9 received just three-fourths, one-half,

and one-fourth, respectively, as much as did lot 6 on full feed at pasture.

The weights of the lots in the pens and yards are given in table X.

TABLE X.
Weights of pigs fed in hog house and yards.

1895.	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Full grain ration in pen.	Full grain ration and grass in pen.	One-fourth grain ration and grass in pen.	Full grain ration in yard.	Full grain ration with grass in yard.
Average, June 27, 28, 29.....	142	141	142	142	139
July 8.....	166	162	140	166	162
Gain.....	24	21	* 2	24	23
July 15.....	182	176	144	180	174
Gain.....	16	14	4	14	12
July 22.....	200	196	156	200	186
Gain.....	18	20	12	20	12
July 29.....	212	214	156	204	190
Gain.....	12	18		4	4
August 5.....	230	230	166	222	†195
Gain.....	18	16	10	18	
August 12.....	250	250	178	240	224
Gain.....	20	20	12	18	26
August 19.....	262	260	174	256	232
Gain.....	12	10	* 4	16	8
‡August 26, 27, and 28.....	281	281	177	277	242
Gain.....	19	21	3	21	10
Gain since June 29.....	139	140	35	135	103
September 2.....	294	290	196	290	260
Gain.....	13	9	19	13	18
September 9.....	310	310	208	308	274
Gain.....	16	20	12	18	14
September 16.....	332	330	230	340	290
Gain.....	22	20	22	32	16
September 23.....	354	348	246	356	308
Gain.....	22	18	16	16	18
September 30.....	378	372	268	388	336
Gain.....	24	24	22	32	28
October 7.....	400	392	280	412	356
Gain.....	22	20	12	24	20
October 14.....	430	412	310	436	374
Gain.....	30	20	30	24	18
October 21.....	444	438	326	476	302
Gain.....	14	26	16	40	28
Average October 28, 29, and 30.....	469	456	341	500	417
Gain.....	25	18	15	24	15
Gain June 29 to Oct. 30.....	377	315	199	358	273
Average gain per pig per day.....	1.33	1.28	.81	1.45	1.18

* Loss.

† One pig sick in this lot. Taken out and another one substituted.

‡ After this date all lots fed on full grain ration without grass.

Table X shows that all except lot 3 made satisfactory gains during the whole feeding period. Lot 3 gained and lost with some irregularity during the time that they received but the one-fourth grain ration. After being put on full feed however, their gain was quite regular and rapid.

The table shows that lot 4 made the best gain, with lots 1, 2, and 5 following in the order named.

Table XI gives the weights and gains of the lots at pasture.

TABLE XI.
Weights of pigs fed in pasture.

1895.	Lot 6. Full ration of grain on pasture.	Lot 7. Three fourths grain ration on pasture.	Lot 8. One half grain ration on pasture.	Lot 9. One fourth grain ration on pasture.	Lot 10. On pasture without grain.
Average June 27, 28, and 29..	119	131	134	134	149
July 8	142	152	144	142	146
Gain	23	21	10	8	* 3
July 15	160	164	154	†184	152
Gain	18	12	10	42	6
July 22	178	182	170	154	150
Gain	18	18	16	* 30	* 2
July 29	202	200	182	168	166
Gain	24	18	12	14	16
August 5	216	214	194	176	172
Gain	14	14	12	8	6
August 12	244	240	216	200	182
Gain	28	26	22	24	10
August 19	262	256	226	208	190
Gain	18	16	10	8	8
†Average Aug. 26, 27 and 28..	280	274	241	213	191
Gain	18	18	15	5	1
Gain since June 29	161	143	107	79	42
September 2	298	296	274	244	224
Gain	18	22	33	31	33
September 9	316	310	282	264	240
Gain	18	14	8	20	16
September 16	338	338	312	290	268
Gain	22	28	30	26	28
September 23	354	360	330	310	290
Gain	16	22	18	20	22
September 30	380	386	366	346	320
Gain	26	26	36	36	30
October 7	411	410	392	378	364
Gain	31	24	26	32	44
October 14	432	442	422	410	392
Gain	21	32	30	32	28
October 21	460	470	456	442	422
Gain	28	28	34	32	30
Average Oct. 28, 29, and 30 ..	483	487	480	474	450
Gain	23	17	24	32	28
Gain June 29 to Oct. 30	364	356	346	340	301
Average gain per pig per day	1.47	1.45	1.41	1.38	1.22

* Loss.

† After this date all lots fed full grain ration.

‡ Thought to be an error in weighing this lot on this date.

In table XI it will be seen that the average weight at the beginning is not the same for all the lots. The lots

were weighed up in this manner so that, if possible, the average weights during the whole experiment would be nearly the same for each lot. For illustration, lot 6 weighed at the beginning 119 pounds and at the end 483 pounds, the average of the two weights being 301 pounds; lot 10 at the beginning weighed 149 pounds, and at the end 450 pounds, the average of these two weights being 299.5 pounds. Taking these weights as a basis it is seen that for the whole time lots 6 and 10 averaged nearly the same in weight.

From the table it is seen that the gains of lots 6, 7, and 8 are quite satisfactory for the whole period, while the gains of lots 9 and 10 fluctuate during the time of the small grain ration. After the full grain ration was given to all, the gain was rapid and quite uniform. It is thought that the weight given for lot 10, on July 15 is not correct, but as it is the weight recorded at the time, it is given. This extraordinary weight was not noticed until two months after the weighing when the figures were being copied.

The table shows that those getting the full grain ration did the best and that the gain varied with the amount of grain fed. Table XII gives the amount of food eaten by the lots in the pens and in the yard.

TABLE XII.
Food eaten by the lots in pens and yards.

1895.		Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.
		Fed full grain ration in pen.	Full grain ration with grass in pen.	One-fourth grain ration with grass in pen.	Full grain ration in yard.	Full grain ration with grass in yard.
From June 29, to Aug. 28.	{ Wheat... Bran... Grass...	513. 57.50 116.00	531.25 54.75 116.00	132.62 14.37 341.00	480.62 56.37	396.75 53.00 97.50
† Aug. 28 to Oct. 30.	{ Wheat... Bran... Grass...	840.50 1353.50 57.50	809.75 1341.00 54.75	736.25 868.97 14.37	829.00 1309.62 56.37	796.50 1193.25 53.00
June 29 to Oct. 30.	{ Wheat... Bran... Grass...	840.50 1411.00 116.00	809.75 1436.35* 116.00	736.25 1002.60* 341.00	829.00 1365.99	796.50 1280.37*
Total, June 29 to Aug. 28.		570.50	626.60*	266.35*	536.99	483.87*
Total, Aug. 28 to October 30.		840.50	809.75	736.25	829.00	796.50
Total, June 29 to Oct. 30.		1411.00	1436.35*	1002.60*	1365.99	1280.37*
Average per pig per day, June 29 to August 28.		4.75	5.22*	2.22*	4.47	4.56*
Average per pig per day, Aug. 28 to Oct. 30.		6.67	6.43	5.84	6.58	6.32
Average per pig per day, June 29 to October 30.		5.73	5.83*	4.07*	5.55	5.51*

* Grass reduced to 10 per cent. moisture.

† All fed full grain ration without grass after Aug. 28.

Table XII shows that the lots in the yards did not eat as much as did the lots in the pens, either with or without grass. During the time that lot 3 was fed on the one-fourth ration it was fed within less than one-half pound of the correct amount—that is, within one-half pound of the fourth of what lot 2 was fed.

Table XIII gives the amount of grain eaten by the lots at pasture.

TABLE XIII.
Food eaten by lots in pasture.

		Lot 6	Lot 7	Lot 8	Lot 9	Lot 10
1895.		Full grain ration on pasture.	Three-fourths grain ration on pasture.	One-half grain ration on pasture.	One fourth grain ration on pasture.	On pasture without grain.
From June 29 to August 28	Wheat	566.25	429.12	282.50	141.75	
	Bran	55.50	41.37	27.00	13.75	
From Aug. 28 to Oct. 30	Wheat	872.25	891.75	917.75	934.00	973.75
From June 29 to October 30	Wheat	1438.50	1320.87	1200.25	1075.75	973.75
	Bran	55.50	41.37	27.00	13.75	
Total June 29 to Aug. 28.		621.75	470.49	309.50	155.50	
Total Aug. 28 to Oct. 30		872.25	891.75	917.75	934.00	973.75
Total June 29 to Oct. 30.		1494.00	1362.24	1227.25	1089.50	973.75
Average per pig per day, June 29 to Aug. 28.		5.19	3.92	2.58	1.29	
Average per pig per day, Aug. 28 to Oct. 30.		6.92	7.07	7.23	7.41	7.73
Average per pig per day, June 29 to Oct. 30.		6.07	5.54	4.98	4.42	3.96

Table XIII shows that, during the time the part rations were being fed, the lots received, within a small amount, their respective quantities. After all were put on full grain rations those which had previously been fed on part rations ate an enormous amount of grain besides what grass was eaten. During this period, August 28 to September 30, lot 6 ate of grain 3.6 per cent. of its live weight per day, while lot 10 ate 4.8 per cent., an increase of $33\frac{1}{3}$ per cent. for lot 10.

As neither the gains made nor the food eaten gives a true measure of the economical side of the question, tables XIV and XV are given. Table XIV gives matter for lots in pens and yards.

TABLE XIV.

Lots in pens and yards.

1895.	Lot 1	Lot 2.	Lot 3.	Lot 4.	Lot 5.
	Fed full grain ration in pen.	*Full grain ration and grass in pen.	* $\frac{1}{4}$ grain ration and grass in pen	Full grain ration in yard.	*Full grain ration and grass in yard.
Fed different grain and grass rations, June 29 to Aug. 28 (60 days).					
Average gain per day per pig, lbs.	1.16	1.17	.29	1.12	.93
" food eaten	4.75	4.87	2.22	4.47	4.24
Pounds of food for 1 lb. of gain, live w't.	4.10	4.17	7.65	3.98	4.57
Cost of food for 1 lb. of gain, live w't. cts. . .	2.97	3.10	3.76	2.88	3.37
Fed full grain ration without grass, Aug. 28 to Oct. 30. (63 days.)					
Average gain per day per pig, lbs.	1.49	1.39	1.30	1.77	1.39
" food eaten	6.67	6.43	5.84	6.58	6.32
Pounds of food for 1 lb. of gain, live w't.	4.47	4.63	4.48	3.71	4.55
Cost of food for 1 lb. of gain, live w't. cts. . .	3.13	3.23	3.14	2.60	3.18
Whole period, June 29 to Oct. 30. (123 days)					
Average gain per day per pig, lbs.	1.33	1.28	.81	1.45	1.18
" food eaten	5.73	5.67	3.59	5.55	5.37
Pounds of food for 1 lb. of gain, live w't.	4.31	4.43	4.44	3.82	4.56
Cost of food for 1 lb. of gain, live w't. cts. . .	3.06	3.17	3.25	2.71	3.25

* Grass reduced to ten per cent. moisture.

Wheat bran 50 cents per hundred pounds.

Ground wheat 75 cents per hundred pounds up to August 28.

Ground wheat 70 cents per hundred pounds after August 28.

Grass, air dried weight, 35 lbs. per 100 weight; \$4.00 per ton.

From table XIV we see that during the first period, while the grass was being fed, the lots in the pens gained the fastest and ate the most, but required more food for one pound of growth than did the lot without grass in the yard. The lot receiving grass in the yard made the slowest gain, ate the least but required the most food for one pound of gain of any of the lots on full feed. Lot 3 gained just one-fourth as much as lot 2.

For the second period, after all lots were put on full grain ration without grass, lot 4 gained the most rapidly, ate within a little of the most, but required the least for one pound of gain. Lots 2 and 5, previously fed grass, gained exactly the same, ate nearly the same and therefore required nearly the same for one pound of growth, this being more than that required by any of the other lots.

For the whole period, lot 4 in the yard without grass, gained the most rapidly, ate less than lots 1 and 2, but required less for one pound of gain than did any of the other lots on full feed. Lot 3 gained the least but required less food for one pound of gain than did lot 5, but this was more than any of the other lots required.

The cost is given, as also are the figures from which this cost is derived. It is of little value as the prices vary so much in different localities.

Table XV gives similar matter for the lots at pasture.

TABLE XV.
Lots in pasture.

	Lot 6	Lot 7	Lot 8	Lot 9	Lot 10
1895.	Full grain ration.	Three-fourths grain ration.	One-half grain ration.	One fourth grain ration.	No grain up to August 28.
Fed different grain rations. June 29 to Aug. 28. (60 days.)					
Average gain per pig per day, lbs.	1.34	1.19	.89	.66	.35
“ food eaten “ “ lbs.	5.19	3.92	2.58	1.29	
Pounds of grain for 1 lb. of gain live weight	3.86	3.29	2.88	1.96	
Cost of food for one lb. of gain, live wt. cts.	2.94	2.60	2.67	2.57	2.85
Fed full grain ration. Aug. 28 to Oct. 30. (63 days.)					
Average gain per pig per day, lbs.	1.61	1.69	1.90	2.07	2.05
“ food eaten “ “ lbs.	6.92	7.07	7.28	7.41	7.73
Pounds of grain for 1 lb. of gain, live wt. .	4.29	4.19	3.84	3.57	3.76
Cost of food for 1 lb. of gain, live wt. cts	3.13	3.00	2.79	2.60	2.73
Whole period. June 29 to Oct. 30. (123 days)					
Average gain per pig per day, lbs.	1.47	1.45	1.41	1.38	1.22
“ food eaten “ “ “ lbs.	6.07	5.54	4.99	4.42	3.96
Pounds of grain for 1 lb. of gain, live wt. .	4.11	3.82	3.55	3.20	3.23
Cost of food for 1 lb. of gain, live wt. cts.	3.05	2.84	2.75	2.59	2.74

All fed full grain ration after August 28.

Grain charged for as in table XIV.

Pasture: Those on full grain ration charged 6 cents per month for each pig; those on three-fourths grain ration 7½ cents per month; those on one-half grain ration 15 cents per month; those on one-fourth grain ration 22½ cents per month; those without grain 30 cents per month.

Table XV shows that during the first period lot 6, on the full grain ration, gained the fastest, ate the most grain and required the most grain for one pound of gain. Counting the cost of both grain and pasture, the gain of this lot cost

more than did the gain of the others. Lot 10, without grain, made about the same gain as did the pigs under like conditions for the past two seasons.

For the second period, those that had previously been fed but the one-fourth grain ration gained the most rapidly on the full grain ration but did not eat so much as did the lot that had previously been kept without grain. This would seem to show, then, that the animals which had previously received no grain did not afterward have the power of fully digesting the food eaten. However, all lots made rapid gains during this period. The cost again favors lot 9.

For the whole period, lot 6 gained the most and ate the most grain and required the most grain for one pound of gain. Counting the cost as we have reckoned it, this lot brought the cost the highest for one pound of pork. In the whole period, the cost again favors lot 9, which, during the first period, received the one-fourth grain ration. As has been said before, this cost varies as prices vary, and the results should be studied with caution.

In table XVI, the lots are arranged for the two periods in groups according to the ration fed.

TABLE XVI.

Arranged in groups according to different rations fed.

1895.	Average per pig per day		Pounds of grain for 1 lb. of grain, live weight.	Cost of grain for one pound of pork, live weight, cts.	
	Gain	Grain eaten			
June 29 to Aug. 28. (60 days.)					
Full grain ration without grass	In pen	1.16	4.75	4.10	2.97
	In yard	1.12	4.47	3.98	2.88
	Average	1.14	4.61	4.04	2.92
Full grain ration with grass.	In pen	1.17	4.87	4.17	3.04
	In yard .....	.93	4.24	4.57	3.30
	Loose in pasture ..	1.34	5.19	3.86	2.81
Average	1.15	4.77	4.20	3.05	
Three-fourths grain ration with grass. Loose in pasture	1.19	3.92	3.29	2.39	
One-half grain ration with grass. Loose in pasture .....	.89	2.58	2.88	2.10	
One-fourth grain ration with grass.	In pens .....	.29	1.22	4.20	3.04
	Loose in pasture ..	.66	1.29	1.96	1.43
	Average .....	.47	1.25	3.08	2.23
Grass without grain. Loose in pasture. ....	.35				
All fed full grain ration. August 28 to October 30. (63 days.)					
Fed previous to October 28: Full grain ration without grass.	In pen	1.49	6.67	4.47	3.13
	In yard	1.77	6.58	3.71	2.60
	Average	1.63	6.62	4.09	2.86
Full grain ration with grass.	In pen	1.39	6.43	4.63	3.23
	In yard	1.39	6.32	4.55	3.18
	Loose in pasture ..	1.61	6.92	4.29	3.01
Average	1.46	6.56	4.49	3.14	
Three-fourths grain ration with grass. Loose in pasture	1.69	7.07	4.19	2.84	
One-half grain ration with grass. Loose in pasture	1.90	7.28	3.84	2.69	
One-fourth grain ration with grass.	In pen	1.30	5.84	4.48	3.14
	Loose in pasture ..	2.07	7.41	3.57	2.50
	Average	1.68	6.62	4.02	2.82
Without grain. Loose in pasture	2.05	7.73	3.76	2.63	

It appears from table XVI, that for the first period an average of those fed the grass with the full grain ration, gained a trifle more than did those without the grass. They ate more, however, and required more grain to make a pound of growth than did those without the grass—the grass being wholly lost. In every case it is seen that those at pasture did much better than the others. The cost given in this table is for grain alone.

For the second period, those that had previously been without the grass but on full grain ration, did better than the lots which had had grass. Again, those at pasture did much better than those not at pasture but receiving the same food.

Table XVII gives the same matter for the whole period.

TABLE XVII.

Arranged in groups as in table XVI.

1895.		Average per pig per day.		Pounds of grain for 1 lb. of gain, live weight.	Cost of grain for one pound of pork, live weight, cts.
		Gain	Grain eaten		
Whole period. June 29 to Oct. 30, (123 days.) Fed up to Aug. 28:					
Full grain ration without grass.	In pen	1.33	5.73	4.31	3.06
	In yard	1.45	5.55	3.82	2.71
	Average	1.39	5.64	4.06	2.88
Full grain ration with grass.	In pen	1.28	5.67	4.43	3.15
	In yard	1.18	5.37	4.56	3.23
	Loose in pasture....	1.47	6.07	4.12	2.92
Average	1.31	5.70	4.36	3.10	
Three fourths grain ration with grass. Loose in pasture	1.45	5.54	3.82	2.69	
One-half grain ration with grass. Loose in pasture	1.41	4.99	3.55	2.50	
One-fourth grain ration with grass.	In pen .....	.81	3.59	4.43	3.12
	Loose in pasture	1.38	4.42	3.20	2.25
Average	1.09	4.00	3.82	2.68	
Grass without grain. Loose in pasture	1.22	3.96	3.23	2.26	

Table XVII shows that for the whole period those without the grass did better than those with the grass, on a full grain ration. In each case those at pasture make a better showing than do those in the yard or pens, fed under otherwise similar conditions.

Table XVIII is arranged to show the effects of exercise and is self explanatory.

TABLE XVIII.

Arranged to show the effects of exercise.

1895.		Confined in hog house pens.	Having exercise.	
			Loose in yard.	Loose in pasture
FIRST PERIOD. June 29 to Aug. 28. (60 days.)				
Full grain ration with- out grass.	Gain per pig per day	1.16	1.12	
	Grain eaten per pig per day	4.75	4.47	
	Grain required for 1 lb. of gain	4.10	3.98	
Full grain ration with grass.	Gain per pig per day	1.17	.93	1.34
	Grain eaten per pig per day	4.87	4.24	5.19
	Grain required for 1 lb. of gain	4.17	4.57	3.86
One-fourth grain ration with grass.	Gain per pig per day	.29		.66
	Grain eaten per pig per day	1.22		1.29
	Grain required for 1 lb. of gain	4.20		1.96
SECOND PERIOD Aug. 28 to Oct. 30. (63 days.)				
Full grain ration with out grass from June 29 to Oct. 30.	Gain per pig per day	1.49	1.77	
	Grain eaten per pig per day	6.67	6.58	
	Grain required for 1 lb. of gain	4.47	3.71	
Full grain ration with grass June 29 to Aug. 28. After this date no grass.	Gain per pig per day	1.39	1.39	
	Grain eaten per pig per day	6.43	6.32	
	Grain required for 1 lb. of gain	4.63	4.55	
Averages.	Gain per day per pig.	1.11		1.19
	Grain eaten per day per pig	4.83		4.63
	Grain required for 1 lb. of gain	4.35		3.89

Table XVIII shows that on the average those getting the exercise did better than the other. Those with the exercise gained 7.2 per cent. faster, while those without the exercise ate 4.3 per cent. more of grain, and required 11.8 per cent. more grain to make a pound of pork.

The subject naturally divides itself into several topics. The average for the different years will be now brought together and discussed.

VALUE OF GRASS.

The only true comparison that can be made on this is between the lots in the pens and between the lots in the yards. Table XIX gives the average gain for a pig in the years indicated and the pounds of grain required for one pound of gain, live weight. Only the grain required for one pound of gain is given so that a direct comparison may be made with the lots at pasture.

TABLE XIX.

Arranged to show the effects of grass.

	1892	1893	1894	1895	Average.
	May 26 to Oct. 14.	June 6 to Oct. 6.	June 27 to September 26.	June 29 to August 28.	
Gain per day per pig.					
Full grain ration without grass, in pen . . . . .	.78		1.33	1.16	1.09
“ “ “ with grass, in pen . . . . .	.77		1.44	1.17	1.13
“ “ “ without grass, in yard . . . . .		.90	1.48	1.12	1.17
“ “ “ with grass, in yard	1.00	1.05	1.31	.93	1.07
One-fourth grain ration with grass, in pen . . . . .			.35	.29	.32
Grass without grain, in pens			*26		*26
Average of those on full grain ration without grass . . . . .	.78	.90	1.40	1.14	1.05
Average of those on full grain ration with grass . . . . .	.88	1.05	1.37	1.05	1.09
Full grain ration on pasture	1.08	1.14	1.65	1.34	1.30
Pounds of grain required for one pound of gain.					
Full grain ration without grass, in pen	6.36		4.70	4.10	5.05
“ “ “ with grass, in pen	6.42		4.37	4.17	4.99
“ “ “ without grass, in yard		4.82	4.41	3.98	4.40
“ “ “ with grass, in yard	5.25	4.06	4.71	4.57	4.65
One-fourth grain ration with grass, in pen			4.68	4.20	4.44
Average of those on full grain ration without grass	6.36	4.82	4.55	4.04	4.94
Average of those on full grain ration with grass	5.83	4.06	4.54	4.37	4.70
Full grain ration on pasture	4.95	3.64	4.23	3.86	4.17

* Loss.

From table XIX it is seen that the average shows a better gain for the pigs fed the grass in the pens, while in the yards the pigs gained the fastest without the grass. With the latter, this is true two years out of three. This was not expected and is difficult to explain. Perhaps with the exercise, the grass with their feed made it too coarse. The pigs fed on the one-fourth grain ration gained nearly one-fourth as much as did those on the full grain and grass ration. The grass in this case was fed wholly at a loss. A general average of those fed the grass, shows a slight increase of gain over those without the grass, the gain amounting to 3.8 per cent. Those running loose in the pasture, however, increased 24 per cent. over the average of those fed in the pens and yards without grass, and 19 per cent. faster than those with the grass. Those fed grass

alone in the pens lost more than a quarter of a pound for each day.

Table XIX also shows that the lots fed grass in the pens, with full grain ration, required a little more grain for one pound of growth than did those without the grass, while the reverse is true with those fed in the yards. The average of those fed the grass, however, shows a slight decrease (4.8 per cent.) in the amount of grain required for one pound of gain. The lots at pasture required 15.5 per cent. less than the lots without grass, and 11.2 per cent. less than those with the grass. The average total food required for one pound of gain, including grass, reduced to 10 per cent. moisture, is about the same with or without the grass. The conclusion, then, seems warranted that grass cut and fed to hogs is of very little value, considered from any point of view.

THE VALUE OF EXERCISE.

Table XX is given to show the effects of exercise; only such lots are included as are fairly comparable for each year.

TABLE XX.

Arranged to show the effects of exercise.

	1892	1893	1894	1895	
	May 26 to Oct. 14.	June 6 to Oct. 6.	June 27 to September 26.	June 29 to Aug. 28.	Averages.
Confined in small pens—without exercise.					
Gain per day .....	.78	.83	1.11	.87	.90
Grain eaten per day	5.00	4.33	4.83	3.95	4.53
Pounds of grain required for 1 lb. of gain..	6.39	5.18	4.35	4.55	5.12
In yards and pasture with exercise.					
Gain per day	1.05	1.03	1.19	1.13	1.10
Grain eaten per day	5.36	4.26	4.63	4.13	4.60
Pounds of grain required for 1 lb. of gain..	5.10	4.17	3.89	3.65	4.20

Table XX shows that for each year those with the exercise gained the most rapidly, the average for the four years being 22 per cent. increase over those confined in pens.

The amount of grain eaten per day is greater with those having the exercise for 1892 and 1895; while those confined ate the most in 1893 and 1894. The average for the four years favors those with the exercise by only 1.5 per cent. But the amount of grain required for one pound of gain is 22 per cent. more for those confined in the small pens, that is, it required nearly one pound of grain more to make a pound of pork with those in the pens. We conclude that exercise has much to do with the proper digestion of the food.

VALUE OF PASTURE.

It is generally conceded that successful hog raising can only be carried on in connection with good pasture. It is evident that in Utah this fact has not been regarded from the proper standpoint. For this reason, the pasture experiments with pigs were instituted at this station. In table XXI the results of the pasture experiments are put in convenient form for comparison with each other, and with other methods of feeding where grass is part of the ration.

TABLE XXI.

Arranged to show effects of pasture.

	1892	1893	1894	1859	Average.
	May 26 to Oct. 14.	June 26 to Oct. 6.	June 27 to September 26.	June 29 to Aug. 28.	
Gain per pig in pounds per day.					
Confined in movable pen in pasture.....		.83	1.16		1.00
Full grain ration. Loose in pasture.....	1.08	1.14	1.65	1.34	1.30
Three-fourths grain ration. Loose in pasture.....			1.23	1.19	1.21
One-half grain ration. Loose in pasture..			.85	.89	.87
One-fourth grain ration. Loose in pasture			.61	.66	.64
On pasture without grain.....		.35	.37	.35	.36
In pen without grain—fed grass.....			*.26		*.26
One-fourth grain ration in pen—fed grass..			.35	.29	.32
Full grain ration in pen—fed grass.....	.77		1.44	1.17	1.13
Full grain ration in yard—fed grass.....	1.00	1.05	1.31	.93	1.08
Grain eaten per pig per day.					
Confined in movable pen in pasture.....		4.33	6.46		5.39
Full grain ration. Loose in pasture.....	5.40	4.16	7.00	5.19	5.44
Three-fourths grain ration. Loose in pasture.....			5.24	3.92	4.58
One-half grain ration. Loose in pasture..			3.55	2.58	3.06
One-fourth grain ration. Loose in pasture			1.77	1.29	1.53
One-fourth grain ration in pen—fed grass..			1.62	1.22	1.42
Full grain ration in pen—fed grass.....	5.00		6.32	4.87	5.40
Full grain ration in yard—fed grass.....	5.27	4.26	6.19	4.24	4.99
Grain required for one pound of growth live weight.					
Confined in movable pen in pasture.....		5.18	5.57		5.37
Full grain ration. Loose in pasture.....	4.95	3.64	4.23	3.86	4.17
Three-fourths grain ration. Loose in pasture.....			4.25	3.29	3.77
One-half grain ration. Loose in pasture..			4.16	2.88	3.52
One-fourth grain ration. Loose in pasture			2.90	1.96	2.43
One-fourth grain ration in pen—fed grass..			4.68	4.20	4.44
Full grain ration in pen—fed grass.....	6.42		4.37	4.17	4.99
Full grain ration in yard—fed grass.....	5.27	4.06	4.71	4.57	4.65
Average of the three lots fed in pens.					.40
					13.41
					14.63
Average of the three similar lots fed loose in pasture.					.77
					13.48
					13.30

†Average of but two lots.

*Loss.

The discussion of the effects of pasture includes the two previous topics, grass and exercise. For this reason, all those that were fed grass in any way are included in table XXI.

From a previous table, XX, it will be seen that, taken under all the varied conditions given, exercise was very beneficial in producing both rapid and economical growth. From table XIX it will be seen that grass is of little value in making a more rapid growth and saves very little grain, when we consider the amount required for one pound of gain. The actual food required, including the grass when reduced to 10 per cent. moisture, is on an average, more for those receiving the grass, whether on a full or a part grain ration. When fed in the pens, where no other food could be obtained, the grass failed entirely as a substitute for grain as the lot fed the one-fourth grain ration required for the average of two years, an increase of 92 per cent. of food to produce one pound of gain. Where grass was fed alone in the pens, there was an actual loss of live weight. Table XIX shows that grass with exercise in the yard, proved detrimental both in the rapidity of gain and in the amount of food required for one pound of gain. This is true for the general average, and it is also true for two years out of three.

Table XXI shows favorable to the pasture for every year and under all conditions except when the pigs were fed in a small movable pen in the pasture. The gains for the pigs fed the part rations are very satisfactory, those with the one-fourth ration averaging nearly two-thirds of a pound per day. Those without grain on pasture made nearly the same gains each year, so nearly the same, averaging .36 pounds per day, that the results seem conclusive.

The amount of grain eaten by those at pasture is slightly in excess of that eaten by those confined in pens. The amount of grass eaten, by those at pasture, must be very much increased, and especially for those receiving but little or no grain, for the table shows their gains to be much in excess of the gains of those similarly fed in the pens. Certainly the lot that received no grain at pasture, gaining on an average of .36 of a pound per day, ate much more than did the lot fed grass in the pen and losing .26 of a pound per day. The pigs at pasture, besides having a choice

of grass on 18 acres, had the opportunity of rooting up the grass and feeding on the roots as well. I think this accounts in a great measure for their doing so much better at pasture than under other similar systems of feeding. At the bottom of table XXI, the average of the averages of the three lots fed in the pens is given, and also of the three similar lots fed loose in the pasture. These averages of the three conditions—full grain fed, one-fourth grain fed, and without grain—are favorable to the pasture. Those at pasture gained 92 per cent. more, while they ate only 2 per cent. more grain than those fed in the pens. It required to make one pound of pork with the two lots in the pens, 40 per cent. more grain, than with the two lots at pasture. It is evident, then, that our results seem to warrant the conclusion that the pasture system of raising hogs is by far the best of the systems included in our experiments. Our results, however, fail to show why this is the case. The experiments indicate that grass, fed green, is of little or no value except for the digestible food it contains, and when combined with exercise is positively detrimental, while exercise seems to help both appetite and digestion. There is room yet for much work along these lines.

EFFECTS OF THE DIFFERENT SYSTEMS OF FEEDING.

There is a belief current, especially in the west I think, that by half starving an animal it will make a large frame, which puts it in good condition, or rather form, for laying on fat very rapidly thereafter. It is further held that the coarse feeds are especially valuable in this direction. It has generally been thought best, also, to delay the slaughtering of the hog until he would dress from 400 pounds to 500 pounds. As to the first supposition, that, namely, of allowing time for building the frame before fattening, it does not appear that there is any good foundation in reason for the belief that by partial starvation there will be developed a greater portion of frame, bone, than by sufficient food from the be-

ginning, if the same kind of feeds are used in each case. As a matter of fact, the observations on this point did not uphold the popular belief in this respect. The second supposition, that the coarse feed may develop a larger frame, seems quite reasonable, for such foods would be very likely to keep the stomach and intestines filled and thereby increase their capacity, thus influencing the subsequent appetite and digestion. Tables V, VI, XI, and XV show plainly that after the periods of part starvation when a large part of the scanty ration was made up of the coarse food, grass, the pigs had enormous appetites and also great power of digestion. This was the reason that it required such a small amount of grain to produce one pound of gain. Both the great appetite and the power of digestion was kept up both seasons to the end of the trial, this period of subsequent feeding lasting about sixty days for each season. The average of the two lots, one previously fed but one-fourth grain ration and the other fed entirely on grass for the subsequent periods shows a gain of 2.15 pounds per day per pig, or a gain of 129 pounds in sixty days. The lot that had previously been fed the one-fourth grain ration did the best each year, making the best gain in 1894 when in sixty days each pig gained 138 pounds. Some of our best local markets demand a pig that will weigh from 175 to 200 pounds. At this rate of growth the limit would be reached in three months.

As to the question of the coarse food or the part starvation period making or rather laying the foundation for a larger hog—it is probably true that such is the case with the coarse food but very questionable in regard to the other. The question of economic importance to be considered resolves itself into—Is the large hog necessary or desirable? Table XXII is designed to at least partly answer this question. In each season, of 1894 and 1895, there were three lots of pigs that went through the whole season without material change in the system of feeding. For each of these lots the amount of grain required to produce one pound of gain is given in the following table as is also the

averages for these two years. All the lots included were fed full grain rations.

TABLE XXII.

Arranged to show increase in food required for one lb. of gain.

	Pounds grain required for one pound of gain, while pigs averaged, in pounds, from					
	75 to 100	100 to 150	150 to 200	200 to 250	250 to 300	Over 300
1894.						
Lot 1	4.00	4.08	5.70	6.07	9.30	
Lot 5	4.17	4.28	4.97	4.84	6.10	10.96
Lot 8	3.19	3.32	5.17	4.94	5.98	9.11
Average	3.79	3.89	5.28	5.28	7.13	10.03
1895.						
Lot 1	3.45	4.54	4.11	5.04		
Lot 4	3.61	4.35	3.38	4.11		
Lot 6	3.30	4.24	3.96	5.07		
Average	3.45	4.38	3.82	4.74		
Average of the two averages	3.62	4.13	4.55	5.01		

Table XXII shows that as the weight increased the grain required for a pound of gain increased as a rule. In 1894 there were two periods in which the amounts are the same and in 1895 it required less when the weights averaged 150 pounds to 200 pounds than it did for the previous period. The average for the two years, however, shows a comparatively uniform increase in the amount required for one pound of gain. When the pigs averaged from 200 pounds to 250 pounds it required 38 per cent. more food for one pound of gain than when they weighed from seventy-five to 100 pounds.

The per cent of increase is about the same for the two years taken separately. In 1894 the pigs were carried to over 300 pounds. From the period at which the pigs weighed 75 pounds to 100 pounds to the period at which they averaged 200 pounds to 250 pounds, 1894, the increase of food for one pound of gain is 39 per cent.; from the same period to that at which the average was over 300 pounds, the increase is 164 per cent.; from the period of 200 to 250 pounds to the period of over 300 pounds, the increase is 86 per cent. Since the markets no longer demand a hog that

will dress over 300 pounds, it would seem that the very large hog is not so profitable and is not more marketable than a smaller animal.

As a rule, the paying hog is the one that can be put on the market from six to ten months old, weighing from 175 to 300 pounds. If this is correct, then there is no time for a partial starvation period; neither is there a necessity for a large frame, for the sooner the hog is put on the market after he weighs 200 pounds, the better for the producer. It is also clear that the animal should be made to reach this weight as early as possible.

HOW TO OBTAIN THESE RESULTS.

Some farmers complain that we tell in the bulletins what we accomplish, but do not tell how they can bring about the same result. It is true that in the bulletins we tell how we do it; and we suppose that without further instruction, the farmers will follow the same methods. It has been shown in this bulletin, for example, that exercise alone is very important; but that when exercise is combined with pasture, the results are much more satisfactory. And from the foregoing pages we may fairly conclude that good pasture for pigs is the most successful and profitable method of raising them. Table XXI shows that the average gain per day, on full grain ration at pasture, is 1.30 pounds. This gain gives us a 200 pound pig at the age of six months, or a 350 pound pig at the age of nine months. The best time to sell, however, would be when the hog is about seven months old, weighing about 250 pounds. In the experiments from which these conclusions are drawn, wheat, corn, barley, and bran, have been used as feed. Of these, the wheat, as a rule, has given the best results. Salt was always within reach of the pigs. The animals were fed with great regularity, and only just what they would eat up clean. We conclude that pigs fed during the summer should be well and regularly fed, and allowed the run of a good pasture. The feed preferred is wheat, but any grain

is good. Salt should be placed where the pig can get it. For greater safety, the salt should be mixed with wood ashes. The pigs should be ready to sell at seven months, should weigh more than 200 pounds, some reaching nearly 300 pounds, live weight.

Our results from feeding part grain rations on pasture, show that while grain is high during June, July, and August, it is much cheaper to use the part grain ration, and that the one-fourth grain ration, which amounts to about 1.5 pounds of grain, to the pig per day is the most economical of the methods tried with part grain rations. This is true after allowing a fair price for the pasture. Pigs on pasture alone, will make a little more than a third of a pound per day, amounting to just 10 pounds per month in the experiments reported in this bulletin.

SUMMARY.

1. Pigs allowed to run at large over eighteen acres of good pasture and fed a full ration of grain, made the most rapid growth and required the least grain for one pound of gain.

2. Pigs confined in movable pens in the pasture grew more slowly than those running loose and required an increase of 20 per cent. of grain to make one pound of growth.

3. Pigs at pasture, fed under three different conditions gained 92.5 per cent. more and ate but 2 per cent. more than the pigs getting grass and otherwise similarly fed but confined in pens. The grain required to produce one pound of gain was increased 40 per cent. with those in pens over those at pasture.

4. Pigs fed but part rations of grain at pasture made satisfactory gains. Those at pasture getting the three-fourths grain ration gained more than those fed a full grain ration and grass, either in the yards or in the pens.

5. Pigs pastured without grain made about the same growth for three seasons in succession, this averaging .36 of a pound per day.

6. As nearly as can be judged, exercise alone increased the gain 22 per cent., and the amount eaten but 1.5 per cent., but decreased the amount required for one pound of gain 22 per cent.

7. Grass when cut and fed green to pigs, whether fed in pens or yards, or with full or part grain ration, or without grain proved to be of very little value.

8. Pigs confined in pens and fed on grass alone, mostly lucerne, for 91 days, lost over a quarter of a pound per day.

9. The average of the pigs fed on grass gained a little more than those without the grass, but not enough to pay for the extra feed in the grass.

10. With the pigs confined in the hog-house pens, the grass proved beneficial, while with those in the yard it proved detrimental, the latter requiring more grain to make a pound of pork with the grass than without it.

11. Pasturing either with full or with part grain rations, appeared to be by far the cheapest and best way of making pork.

NOTE. The grass is a mixture of eight varieties in which lucerne constitutes at least one-half.