nearly its equal that the committee divided. This latter herd contained the two-year old steer declared the best animal in the show, and the three-year-old winner over all three-year-olds shown. They were full brothers, bred and fed by the exhibitor. The sweepstakes yearling was a Hereford, and so was the sweepstakes calf. The sweepstakes carcass prize was awarded to a two-year-old half-blood Galloway which had attracted little attention alive. The prize for three-year-olds went to a Galloway-Hereford cross; that for yearlings to an Angus.

A few large steers were shown, not counting those in "side shows." One weighed 3,185 pounds, and had no other recommendation. In the regular classes there were some remarkable weights for age, perhaps the most noticeable case being that of a pure bred Short-horn yearling weighing 1,685 pounds.

A comparison of the weights by ages, with gain per day of the various classes shown, is interesting and valuable, much more so than such facts concerning any one or two animals. The accompanying table gives these facts for the classes in which more than one animal was exhibited.

| Breed. | Age in yrs. | No. Shown | Age in days. | Av. W't. | Gain per day | Heaviest in class. |
|---|---|---|---|---|---|---|
| Angus..... ..... | 2 | 3 | 1057 | 1802 | 1.70 | 1995 |
| | 1 | 5 | 604 | 1285 | 2.11 | 1500 |
| Devons ..... | 3 | 2 | 1331 | 1512 | 1.14 | 1665 |
| | 2 | 3 | 1015 | 1435 | 1.41 | 1495 |
| | 1 | 3 | 578 | 1053 | 1.82 | 1105 |
| | | 2 | 195 | 550 | 2.82 | 500 |
| Herefords..... | 1 | 4 | 690 | 1358 | 1.97 | 1545 |
| | | 4 | 336 | 855 | 2.54 | 900 |
| Short-horns.... ... | 3 | 4 | 1285 | 1975 | 1.54 | 2185 |
| | 2 | 11 | 939 | 1692 | 1.80 | 1905 |
| | 1 | 15 | 632 | 1384 | 2.11 | 1685 |
| | | 5 | 320 | 813 | 2.73 | 1035 |
| Grades and crosses. | 3 | 22 | 1275 | 1961 | 1.54 | 2370 |
| | 2 | 37 | 985 | 1685 | 1.76 | 2095 |
| | 1 | 37 | 583 | 1284 | 2.20 | 1605 |
| | | 12 | 330 | 535 | 2.53 | 950 |

In studying this table—and I think it worth columns of the opinions of any man, as showing the possibilities of production of first-class beef cattle—care should be taken to notice comparative age in days of animals in the same class by years. Thus the daily gain of a lot of calves averaging 195 days, ought to be greater than that of a lot averaging 336 days, while the average weight would be much less. The one three-year-old Angus shown weighed 2,225 pounds, and a three-year-old Sussex made a good showing, but these are not included in the table. Aside from the Devons, which average, perhaps, 250 pounds lighter than the others, there are no striking differences between the breeds, the Short-horns and the grades, which were in good part Short-horns, having somewhat the best of the contest.

We are not to accept the figures as representing the most profitable weight at which to market cattle, for even the averages are not reached as a rule in practice, but they do seem to indicate that it ought not to be necessary to keep steers until past three years old before slaughtering them.

University of Illinois.—R. N. Y.

## About the Travels of Plant Roots.

Our respected brother who edits the agricultural department of the Brattleboro *Phœnix* copies our remarks on the above subject, and says:

"The above is a rational explanation of the reason that the roots of plants appear to have a kind of instinct that directs them in their search for food. Still it is not conclusive; i is a question whether plants can "only grope blindly in all directions for nutriment." Is it any more for the roots of a plant to turn in the direction where its food is to be found than for the sunflower to turn toward the source of light and heat? If the roots which strike into the richest spots grow fastest, that fact is hardly sufficient to account for their taking the direction of the rich spots, and passing through barren soil, sometimes for a considerable distance, to reach them. If they do not do this a large number of writers, observers and scientists are at fault Professor S. W. Johnson says the length of the roots depends on the nature of the soil. 'Where this is rich, the roots tend to remain; they branch and ramify through all the pores of a small bulk of of earth. Where this is poor, they stretch off and are sparsely distributed. Where they find plenty of food, they grow and ramify upon it. Where nourishment is lacking, they seem *to go in search of it.*'"

Professor S W. Johnson is an authority in agricultural science to whom all must bow. He once wrote to us that our paper (the *Vermont Farmer*) was "remarkable, in comparison with others, for what it *did not* say," referring to the large number of undigested and incorrect statements current in the agricultural press. (1) This was recalled to us by the above quotation from the professor, who *does not* say that plants "go in search" of nourishment, but that they "seem" to do so. It is this very "seeming" which has misled superficial and sentimental writers on the subject. A careless view of the matter gives apparent confirmation to the idea, but when we reflect that a plant has no nervous system, and consequently no senses, we must at once realize that it can have nothing in any way analogous to what is called "instinct" in animals.

The turning of the sunflower to the sun is no more the result of instinct than the rising and falling of the mercury in a thermometer, both being the result of physical causes. The whole question of the action of plant roots, as regards their dispersion in the soil, has been made the subject of many experiments, the results of which prove that in an insoluble soil, of finely divided mineral substance, the roots of plants fed by a watery solution of plant-food will be produced with perfect symmetry on all sides. But if solid but soluble plant-food is distributed in layers, or irregularly in pockets, in such a soil, the development of the roots will coincide with those deposits with perfect accuracy. When a root reaches such deposit it branches so thickly as to perfectly occupy and include it; but as soon as it exhausts the soluble matter there, root fibres are again sent out symmetrically in all directions through the infertile soil, until another fertile spot is found, when the same thing takes place, and will occur again and again, so that when the plant is washed out from the soil in which it was grown the positions of the fertile deposits may be mapped out with perfect accuracy from the roots themselves. It was these experiments to which Professor Johnson no doubt refers, and they thoroughly prove the truth of the views expressed in our remarks, quoted by our friend of the *Phœnix*.

Dr. HOSKINS.

(1) Which in some of the leading agricultural papers in the States are surprisingly numerous. A. R. J. F.