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NEW-TYPE TESTS IN AGRICULTURE

The new-type tests are being used with success in a great many different subjects and doubtless possess many values for the instructor of agriculture. The alert teacher of agriculture is always on the lookout for devices by which he can more satisfactorily diagnose his daily situations in presenting the work and more satisfactorily appraise the effectiveness of his presentation. The more recent attention to instruction in agriculture through individual problems actually makes the use of tests handy tools for diagnosis and appraisal of results all the more necessary. As a new job or enterprise or topic is being taken up either by the class or the individual the instructor can advantageously use such a test as a pre-test or survey device to find out what the individual or the group already know. After the unit has been taught he finds in the new-type test a handy tool for testing the progress the class has made with that unit. The tests illustrated here, of course, do not aim to test the skill of the student but rather aim to test two other factors which analyses of farm enterprises and farm jobs indicate are essential: (1) knowledge of facts and (2) ability to use those facts in reaching decisions. The reader has doubtless had some contact with the new-type tests either as a student in class where they were used or in the use he as a teacher may have made of them with his own classes. However, it is quite possible that his experience may have been with just a few forms of the test or possibly with only one kind as the true-false test. There is quite a variety of forms of these tests and as he tries them out the agriculture instructor will see their particular value in his teaching. Doubtless he has sensed the need of just such instruments before, but was helpless because of the lack of handy tests to serve the purpose. This article is designed to show the application of new-type tests to agricultural subject matter by giving illustrations of the forms of the tests and by giving some indication of the suitability of different kinds of tests for different kinds of subject matter. Briefly we need to know the different forms of tests and need to have judgment in using the different kinds.

The most satisfactory manner of giving the tests is to have a mimeographed or carbon copy for each member of the class

but some of the tests, as the instructor will find by experience in using them, can be given orally by the teacher or may be presented on the blackboard, the pupils marking their response on papers which are uniformly numbered. In practically all of the tests the score is the number right. However, in the true-false test the usual scheme of scoring is to find the score by subtracting the "wrongs" from the "rights." This is deemed necessary because of the large element of chance in the two-element choice. Time saved in scoring is one of the big advantages of the new-type tests and the instructor should aim to make the scoring just as easy as possible. Often they can be satisfactorily scored by the students exchanging papers. By the use of this procedure the scores are available immediately and the errors can be checked while the interest of the student is keen. It takes a longer time to construct such tests than to construct the old-type examination but the time saved in scoring can be shifted to making the tests and as one author says "that is where it belongs." Another big saving can be effected thru developing a filing system for the tests on different units of subject matter so they can be used or revised for the next time.

A very significant point about the new-type tests and one that the instructor should keep quite clearly in mind is that they are usually one of two types: *Recall* or *Recognition*. Generally it is considerably easier for the student to recognize a correct element when it is presented, even if it is mixed in with several other elements, than it is to recall the correct element. In some of the recall types of tests as the association test and the enumeration test practically everything is to be recalled while in others as the completion test the given context furnishes many clues to the student and he must recall only certain strategic elements. In case of the recognition type of tests the instructor should recognize that in certain of them as in the true-false situation is narrowed down to a choice of one of two possibilities. In others as in the multiple-choice test and the matching test the situation demands a choice of usually one element from several given. Thus it will be seen that the recall type of test demands that the student initiate more

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but consequently the test tends to be less objective. The recognition test is generally easier for the student, by setting the limits within which a choice is to be made, and consequently is more objective. Sometimes the instructor may find it quite easy to change a recall type of test to a recognition type or vice-versa. The progressive instructor will do well to try out all of the forms of tests illustrated. He should carefully study the trials made with a wide variety of these tests as to how well they serve him, the ease of constructing and administering them, which forms the students prefer, and the types that seem best suited to certain kinds of agricultural subject matter.

Samples of New-Type Tests in Agriculture

The samples are merely illustrative and are not exhaustive test of the units chosen. In this article the symbol (*) is used to indicate that in actual practice with the tests space would be needed for the response of the students. Ease in checking answers demands that in actual practice the numbers of the questions stand in a line under the first one.

I. SINGLE-WORD ANSWER

Unit: Babcock Test for Milk

Directions: Write one word as answer to each of the questions as given.

1. What kind of acid is used? *
2. When was the test developed? *
3. Where was the test developed? *
4. What quantity of milk is used in the test? *
5. What is the quantity of acid used on the test? *
6. What sp. grav. of acid should be used? *
7. What is used to preserve a milk sample? *
8. What is the name given to the upper limit of the fat column? *
9. What does the Babcock test measure? *

10. At what rate per minute should the tester be run? *
11. What is the specific gravity of butter fat? *
12. What is the name of the force generated by the tester? *

II. COMPLETION TEST

Unit: How Legumes Build Up the Fertility of the Soil

Directions: Fill in the missing word or words so as to complete the thought.

Soils deficient in () generally produce a scanty growth but it was discovered that certain plants, as legumes, grew in poor soils about as well as they grew in rich soil. Even if the farmer harvested the upper parts of the legume plant to feed the livestock, the soil was richer in () than it was before. If we dig up a thrifty clover plant, which is a legume, and examine its roots we will see many small enlargements or bunches which are called () or (). By close examination with a () it is found that these bunches contain millions of bacteria. Such plants are called legumes and such bacteria are called (). Thus a relationship was found between these bacteria and the () in the soil following their growth. The explanation of the process is as follows: Ordinarily we think of plants taking only () from the air thru the () and getting the rest of the materials for plant growth from the soil solution taken up by the (). It is a well-known fact that a large proportion of the air surrounding the plant is composed of () and altho the plants need it as an essential element of plant food yet they are () to utilize it directly but must secure it from the (). However, legume plants are peculiar. It has been found that the bacteria in the () of legume plants are responsible for this storage of (). In order for the bacteria to live, they utilize the () which is in the air in the soil and thus store it in the plant in the roots (), () and (). While living the plant can use some of this stored supply and as it decays the soil is richer in this element than before and other plants can use it. However, legumes cannot add other valuable plant foods as potash and () to the soil and so they have to be supplied by the use of other means. Other legume plants which the farmer uses are (), () and (). This process of making the free () of the air combine with other elements and consequently become stored in the soil is called ().

III. TRUE-FALSE TEST

Unit: Characteristics of Milk.

Directions: In parentheses to left of each statement mark (+) for true and (O) for false statements. Do not guess.

- () 1. Ninety per cent of milk is water.
- () 2. There is a larger per cent of fat in milk than per cent of sugar.
- () 3. There is some mineral matter in milk.
- () 4. Milk is heavier than water.
- () 5. The quantity of butter that can be made from certain amount of milk depends upon the amount of fat present.
- () 6. The richness of milk can be judged by its color.
- () 7. Condensed milk has 50% water.
- () 8. Milk is pasteurized by boiling it.
- () 9. Souring of milk is due to the action of bacteria.
- () 10. Milk testing 5% fat is said to be a high test.

IV. ENUMERATION TEST

Directions: In the spaces below fill in the required information.

* indicates that space is needed for response of student.

Illustrations.

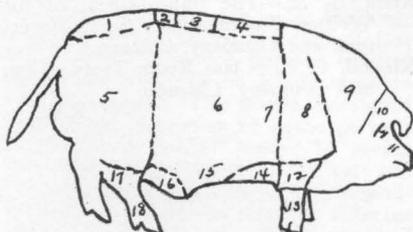
- 1. Name 4 major breeds of beef cattle.
 - 1. *
 - 2. *
 - 3. *
 - 4. *
- 2. Give 3 advantages of winter dairying.
 - 1. *
 - 2. *
 - 3. *

Va. DIAGRAMMATIC TEST

Unit: "Points" of a Hog.

Directions: Opposite the numbers below the diagram place the names of the parts represented by the numbers in the diagram.

* indicates that space is needed for response of student.



- | | |
|------|------|
| 1. * | 6. * |
| 2. * | 7. * |
| 3. * | 8. * |
| 4. * | Etс. |
| 5. * | |

Vb. VARIATION OF DIAGRAMMATIC TEST

The test as given in Va is a recall test. By supplying the diagram of the hog but without the numbers on it and furnishing a numbered list of parts below the test is changed into a matching test.

VI. IDENTIFICATION TEST

Directions: Use with material specimens at hand as plant specimens, grain and fruit varieties, weed seeds, etc. Have each in suitable container and suitably numbered. Students to work with uniformly numbered papers corresponding to numbers of samples. Either boys can be routed past the samples or samples can be routed past the boys. Handled in this way it is a recall test. By placing an unnumbered list of names of the samples on the blackboard then it becomes really a multiple-choice test.

VII. ASSOCIATION TEST

Unit: Characteristics of the Soil.

Directions: Opposite each term write a short true statement explaining its meaning.

* indicates that space is needed for response of student.

- 1. Loam *
- 2. Subsoil *
- 3. Humus *
- 4. Organic matter *
- 5. Silt *
- 6. Soil texture *
- 7. Tilth *
- 8. Light soil *
- 9. Capillary water *
- 10. Leaching *

VIII. MULTIPLE-CHOICE TEST

Unit: Breeds of Dairy Cattle.

Directions: Underline the word or words making the correct answer.

- 1. The Holsteins came from (Holland—England—Scotland—France).
- 2. Average Guernsey milk tests about (3%—3.5%—4%—4.5%—5%).
- 3. The heaviest milkers are the (Jerseys, Guernseys, Holsteins, Swiss).
- 4. The most popular dairy breed in Minnesota is (Jersey—Guernsey—Holstein—Swiss).
- 5. The average size for a Holstein cow is (800 lb, 1000 lb, 1200 lb, 1400 lb).
- 6. Comparing the Jersey and Guernsey as to size (about same size—Jersey larger—Guernsey larger).

IX. ARITHMETIC PROBLEM TEST

Directions: Solve these problems.

* indicates space is necessary for response of student.

- (1) At the usual rate of seeding how

- much oats does a farmer need to seed 80 acres? *
- (2) You have 100 bu. of oats to seed and want to treat them with formalin treatment. How much need you buy? *
- (3) A farmer has a bin 8 feet square which has a depth of 6 feet of oats in it. How many bushels? *

Xa. MATCHING TEST

Unit: Breeds of Dairy Cattle.

Directions: From column B choose items which match items in column A and place the corresponding number in parentheses. More than one item may apply to a single breed.

- | | |
|----------------------|---|
| <i>Column A</i> | <i>Column B</i> |
| () () Devon | 1. Has best developed udder of any of the breeds. |
| () () Jersey | 2. An Irish breed of cattle. |
| () () Guernsey | 3. May Rima. |
| () () Dutch Belted | 4. Noted for especially high color of milk. |
| () () Brown Swiss | 5. One of the earliest maturing of the breeds. |
| () () Holstein | 6. Duchess Skylark Ormsby. |
| () () Ayrshire | 7. First breed association to establish tests with experiment stations. |
| () () Kerry | 8. Common breed in cheese producing sections. |
| | 9. An English breed. |

Xb. ANOTHER MATCHING TEST

Unit: Drilling Oats vs. Broadcasting.

Directions: Consider these two farm practices and the list of advantages given. From column A choose the practice which matches with the advantages in column B and place the corresponding number in parentheses.

- | | |
|-----------------------|---|
| <i>Column A</i> | <i>Column B</i> |
| Practices | Advantages |
| (1) Drilling Oats | () Less seed is required per acre. |
| | () More acres per day can be seeded per unit of power. |
| | () The soil receives additional stirring. |
| (2) Broadcasting Oats | () The seed is planted at a more even depth. |
| | () Oats may be seeded earlier in the season. |
| | () Oats are less likely to lodge. |

XIa. JUDGMENT TEST

Unit: Centralized Hog House.

Directions: Each statement as given is true. In the space after each statement, give the best reason or reasons why you believe it to be true. Be concise.

* indicates space is necessary for response of student.

1. The house should be located where the drainage is good. *
2. The sunshine should penetrate every part. *
3. The alleys should be 4 feet wide. *
4. A concrete floor is inclined to cause rheumatism. *
5. Earth floors are likely to be unsatisfactory. *

XIb. ANOTHER JUDGMENT TEST

Interpretation of a table of data is really a judgment test. In the first form given here the student examines the table of data and derives his own conclusions.

Directions: Examine this table of data carefully and draw four conclusions. Then rank them 1, 2, 3, 4 in order of their importance.

* indicates space is necessary for response of student.

Table. Relation of Ear Type to Yield. (See Test XIb and XIc)

Type of Ear Planted	Yield of Grain Per Acre						Average
	1914	1915	1916	1917	1920	1921	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	
1. Long, large, rough	30.0	65.3	64.4	45.9	55.2	64.0	54.1
2. Short, large, rough	44.0	68.9	65.1	49.9	51.5	63.8	57.3
3. Short, slender, smooth	45.0	72.6	60.1	49.2	50.4	65.5	57.1
4. Long, slender, smooth	48.7	66.4	65.2	54.9	56.0	63.2	59.1
5. Ordinary Neb. White Prize	48.7	64.8	65.5	53.5	53.7	63.7	58.3

Conclusions: a * b * c * d *

XIc. ANOTHER JUDGMENT TEST

Instead of requiring students to initiate the conclusions the test may be made whereby the student is to check from a list.

Directions: Carefully examine the table of data and check (X) the valid conclusions.

- () 1. Long, large, rough ears yielded 5 bu. less than long, slender, smooth ears.
 () 2. The short ears yielded practically alike. () 3. The long ears yielded practically alike. () 4. The year does not seem to make much difference.
 () 5. Evidently 1915 was a good corn year. () 6. The year 1916 presents the narrowest range of yields.

XId. ANOTHER JUDGMENT TEST

Another form of a judgment test is really a form of multiple-choice test.

Unit: Advantages of a Concrete Floor in a Central Hog House.

Directions: In the parentheses to the left of the advantages given, check the 3 which you regard as the most valid.

- () 1. It is cheaper. () 2. It is more easily kept sanitary. () 3. It is warmer. () 4. It is rat proof. () 5. It is ideal from point of view of health of pigs. () 6. It prevents hogs from rooting it up.

WHAT FORM OF TEST TO USE

The teacher's problem is to choose an appropriate type of test for the unit of subject matter at hand. The following are some of the different types of subject matter in agriculture with which the instructor will have to deal, both in teaching it and in testing the learning of the class. The different forms of tests referred to are illustrated in the previous section of this article.

TYPES OF SUBJECT MATTER

1. Concepts, Technical Terms, Vocabulary.

In presenting almost any new unit or topic, a series of new terms will be met.

Unit: (a) Soil characteristics. New terms: Loam, silt, subsoil, tilth, leaching, etc. *Unit:* (b) Legume plants. New terms: Bacteria, nodules, nitrogen, inoculation, etc. *Unit:* (c) Improvement of animals. New terms: Pure bred, grade, scrub, sire, dam, etc.

Suitable Forms of Test to Use for This Type of Subject Matter: Association, completion, true-false, single-word answer.

2. Laws or Principles.

Students may be asked to give either the generalization or concrete cases of the generalization or both.

Illustrations of Units: (a) Law of diminishing returns. (b) Supply and demand. (c) Heredity. (d) Principles of fertility.

Suitable Forms of Test to Use: Association, completion, single-word answer.

3. Computation Rule, Formula—Prescription.

These are generally quantitative. Students may be asked to give the rule involved or use the rule in a concrete problem.

Illustrations of Units: (a) Capacity of a bin or silo. (b) Measuring hay. (c) Measurement of lumber. (d) Rules for feeding animals. (e) Formalin treatment for prevention of oat smut. (f) Prescriptions for simple treatments of animals.

Suitable Form of Test to Use: Enumeration, completion, arithmetic problem, single-word answer.

4. Classifications of Breeds, Varieties, Types.

Attention is directed to the classification rather than to the characteristics and features of the elements or parts classified.

Illustration of Units: a. Breeds of Horses, Sheep, Poultry, etc. b. Varieties of grain, fruit, vegetables, grasses, trees, c. Brands of feeds, fertilizers, etc. d. Soil types. e. Types of plows, drills, harrows.

Suitable Form of Test to Use: Enumeration, identification, multiple response, matching.

5. Simple Statements of Fact Concerning Possession of Features or Characteristics or Their Existing in Certain Degree or Quantity.

Mostly description of objects, processes or situations.

Illustrations of Units: a. Characteristics of the Shorthorn breed. b. Characteristics and features of milk. c. Culture or cultivation of a certain crop or variety. d. Desirable features of a hog house. e. Features of a certain crop rotation plan.

Suitable Form of Test to Use: True-false, multiple-response, completion, matching, enumeration, single-word answer.

6. Wholes and Their Members—Identification and Their Location.

Illustrations of Units: a. "Points" of a horse—hog, etc. b. Parts of a corn plant—oat plant, etc. c. Cuts of meat of a beef carcass, hog, etc. d. Parts of a plow, drill, etc. e. Parts of a flower.

Suitable Form of Test to Use: Diagrammatic, enumeration, identification.

7. Materials and Their Constituents—Deals with Names of Constituents and with Tables of Data of Analyses Made.

Illustrations of Units: a. Composition of feeding stuffs. b. Feed mixtures. c. Feed and soil analyses. d. Spray materials. e. Simple medicines.

Suitable Form of Test to Use: Enumeration, completion, arithmetic problem, single-word answer.

8. Processes of Nature as Applied to Agriculture.

Illustrations of Units: a. Process of digestion. b. Formation of soils. c. Germination of seeds. d. Improvement of plants through seed selection. e. Metamorphosis of the fly—grasshopper. f. How bacteria cause diseases.

Suitable Form of Test: Completion, true-false, single-word answer.

9. Activities or Operations or Steps in Agricultural Practice. Steps and Their Sequence: These are performed by the farmer.

Illustrations of Units: a. How to perform the Babcock test. b. How to eradicate quack grass. c. How to mix Bordeaux mixture. d. How to treat oats for smut. e. How to pasteurize milk. f. How to field-select seed corn.

Suitable Form of Test to Use: Completion, true-false, enumeration single-word answer.

10. Given an Agricultural Situation, Practice or Status. To Consider Its Essentials or Requirements or Factors Involved or Advantages and Disadvantages.—Only one situation, practice or status considered at the time.

Illustrations of Units: a. Breeding purebred animals on a certain farm. b. Raising alfalfa on farm. c. Practice of vealing calves. d. Practice of summer fallowing. e. Choosing a good crop rotation. f. The location for a new barn.

Suitable Form of Test to Use: Judgment, enumeration, true-false, completion, multiple-response.

11. Choice Between Alternative Situations or Practices.—Deciding which practice to follow.

Illustrations of Units: a. Holsteins vs. Guernseys, etc. b. Choice between varieties of corn to raise. c. Dairy farming vs. beef farming. d. Choice between certain recommended rations. e. Choice between use of individual hog houses or central hog house. f. Use of all horse power on farm or purchase a tractor.

Suitable Form of Test to Use: Judgment, enumeration, true-false, matching.

12. Cause and Effect Relationships.

Illustrations of Units: (The first element in each pair is cause and the second is effect.) (a) Insects and diseases—Plants and parts of plants attacked. (b) Insects and diseases—Sprays to use. (c) Simple ailments of animals—Simple remedies. (d) Good rations—Good gains.

Suitable Form of Test to Use: Enumeration, completion-matching, true-false.

13. Structure—Function Relationships.

Illustrations of Units: (The first element in each pair is structure and the second element is function of that structure). a. Parts of a plow—Use of each part. b. "Points" of a dairy cow—How they indicate dairy temperament. c. Food constituents—Uses body makes of each. d. Names of digestive organs—Part each plays in digestion. e. Names of digestive fluids—Foods constituents upon which each acts. f. Parts of a horse's foot—Function of each part.

Suitable Form of Test to Use: Enumeration, completion, true-false, matching, single-word answer.

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