Coarse and Curriculum Development in a School of Agriculture

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To meet the brain power needs of the broad agriculture industry in the decades ahead, graduates of professional schools of agriculture must be especially well-equipped. They must be well-grounded in mathematical, physical, biological, and economic sciences. They must be adaptive to changing technology, changing demands of society, and changing relationships with other countries of the world.

Each of you is probably directly involved in a 4-year curriculum or major in one or more branches of agriculture, a 1-year or 2-year program from which students transfer to a 4-year curriculum at a university, and or a 1-year or a 2-year terminal college program in agriculture. Likely you all teach or administer courses in professional agriculture—introductory courses in each of several areas, perhaps courses in specific agriculture disciplines such as nutrition or soil fertility, and terminal "production" courses in each of several areas. You have, therefore a stake in this discussion of courses and curriculum development.

I consider agriculture courses and agricultural curriculum as separate issues. They are related, of course, and you are obviously aware of the many relationships, but this discussion will consider them separately. Too, 4-year curriculum and shorter terminal programs have different purposes and goals. Time will not permit attention here to the short terminal programs.

Not all aspects of course and curriculum development will be covered. I will try to hit the "high spots" and offer illustrations and examples. Because my own field is animal science, most illustration will be in that field.

FOUR-YEAR PROFESSIONAL CURRICULUM

Historically, curricula in Schools of Agriculture have been separated by and identified with commodities—dairy cattle, poultry, farm crops, horticulture, etc. Recent attempts on some campuses to consolidate curriculum within agriculture, for improved administrative efficiency and for other reasons, have adhered to the commodity identification. In some cases, Animal Husbandry, Dairy Husbandry, and Poultry Husbandry have been consolidated into an "Animal Science" curriculum. A similar consolidation could result in a "Plant Science" curriculum; some even have tried to identify a "social Science" area, including Agriculture Economics, Rural Sociology, Agriculture Education, and Extension Education, but such a wedding as the latter seems to me a bit artificial. Unless there is cause and reason for concurrent consolidation of faculties, such curriculum changes as these hardly seem to warrant the effort.

How Should Curriculum be Aligned?

The curriculum question that should be asked now, as Schools of Agriculture are reassessing their positions for the decades ahead, is, "If curricula were being created in 1963, and had not existed before, how would they be separated, aligned, and identified. Would we consider:

a) Commodity identification—livestock vs. crops vs. oramentals?

b) Academic ability of students—high vs. medium vs. low?

c) Basic discipline alignment—biochemistry-nutrition—plant physiology vs. soils-geology-phyics-chemistry vs. genetics-cytology-embryology vs. economics-sociology--physchology?

d) Kinds of occupation the graduates would likely enter—research vs. selling vs. writing and advertising vs. farming and ranching?

e) Basic and measured student aptitudes and interest—clerical vs. linguistic vs. mechanical vs. persuasion vs. artistic vs. scientific?

I would cast a vote for "d" above, because (1) the developed curriculum would tend to "fit" the interests and motivations of students, and (2) the goal is clear, both to the student and his academic adviser. It is obvious that the other alignment should be considered. No one kind of alignment will individually meet all the needs of all students, all disciplines, or all employers.

Relationship of Curricula to Departments.

A curriculum organization that is different from a faculty or departmental organization leads to difficulties in administration. Departments in larger Schools of Agriculture are presently arranged, in most cases, by commodities and curricula are similarly organized. We should not hold this fact sacred, but should recognize the fact.

Options within Curricula

Curriculum identification with commodity-oriented departments can work fine, but options in each curriculum and or good academic advising should permit and cause development of strong programs for **production** (farming, ranching, farm management, soil conservation service, traditional country agent work etc.), **business** (selling, personnel management, industry operations, journalism, advertising, etc.), and **science** (graduate study, quality control, industry research and development, pre-veterinary medicine, etc.).

Perhaps **Agriculture Education** (vocational agriculture teaching, county agent work, "education" work in industry) should remain a separate curriculum, but certainly students in commodity curricula can effectively prepare for these jobs by minoring in education. As high schools and vocational agriculture departments get larger and as field extension units become geographically larger, and subject matter specialists are desired, this will be increasingly true.

"Production options" are really the traditional agricultural curricula. That doesn't mean they have a right to remain unchanged, though. I belive that college graduates who intend to farm for the next four decades, for example, should be strong in **biochemistry** (they'll make a lot of daily management decisions based on their knowledge of plant physiology and animal nutrition), strong in **local and state government** (they'll be the respected leaders in school district, county government, and extension district reorganization), and strong in **principles of taxation** (because of property tax customs, they have more at stake here than do most other members of society). How many "production options" or traditional agriculture curricula can boast **these** or **other equally important** strengths?

Many **business options,** most having been developed in recent years, are **"weak sisters"**! Why? We lack familiarity with industry needs and don't turn loose our imagination. You and I have strong backgrounds in **production** and science, but is our industrial and business experience of any significance?

One such business option I have seen developed went only so far away from traditional "husbandry" as (1) farm finance, (2) business law, and (3) a second course in speech!

How about (1) a year of accounting, (2) theory of investments, (3) contracts, (4) principles of taxation, (5) corporate structures and corporation law, (6) transportation, (7) psychology of salesmanship, (8) labor unions and labor legislation (9) principles of personnel management, (10) "economic" history in place of "agricultural" history, etc?

Academic Advising.

The key to success of **any** curruculum aligment or stucture is **thorough** and **strong** academic advising by respected faculty members. If the school faculty is wise in permitting considerable flexibility, the student and adviser should be able to adapt the curriculum to make it **most effective for that particular student.**

Thorough advising means that the adviser be well acquainted with the student's **academic abilities** (high school courses and grades, courses and grades transferred from another college, if any, ACT or other academic ability scores, other test data), the student's **non-academic background** (farm or business experience, social and educational status of parents and community), and the student goals, motivation, ambitions, and fears. The adviser must be **personally acquainted** with the student, and his knowledge of the student must guide him in the advice he offers and the judgement decisions he makes in behalf of the student.

Likewise, the student must know the adviser —his interests, teaching and research involvements, biases, etc.—so he may properly and wisely interpret advice given by the adviser.

I also suggested **strong** academic advising. There is a fine, but real, line between "railroad ing" the student into a program or course sequence (subconsciously designed to follow the adviser's footsteps or the path the adviser wishes he had followed, and guiding him with encouragement, temptation, commendation, persuasion, etc. to plan and follow that program which would be best for the student.

Strong advising would result, for example, in (1) top students taking a year of calculus even though algebra and geometry is all that is "required," (2) a student taking three courses in speech and joining a toastmaster's club, especially if he is relatively weak in speaking ability, (3) many students seeking and locating worthwhile summer jobs, especially those who have never held a summer job and who will likely seek employment following graduation, (4) students taking a realistic approach to extra-curricular activities, and (5) average-ability students limiting themselves to courses and a credit load in which they can perform well.

ONE-YEAR AND TWO-YEAR PRE-UNIVERSITY PROGRAMS

Pre-university programs in Agriculture should, of course, be **coordinated** with the specific university (s) to which most students transfer. Students preparing for the "traditional" agriculture curriculum can usually spend two years at a junior college or other college which offers pre-professional programs. For certain agriculture curricula, such as flour milling, dairy manufacturing, feed technology, and landscape architecture, specialized courses and tight sequences usually require that the student move to the university at the beginning of the sophomore year, if he wants the degree in four years.

A second principle is that junior colleges or other colleges offering pre-professional programs, and some professional courses in these areas, cannot afford to spread their resources—faculty

or operating funds—too thinly. It is best to teach a few professional courses effectively, if funds are limited, and to teach those where your faculty is strongest. My conviction that those who teach introductory courses, such as Principles of Animal Science, must be well-trained and experienced in their field, will be evident in our discussion of these courses.

Good professional courses are expensive to teach. We have cost problems on our campus and are searching for ways to become more efficient. The cost is high because (1) we will not accept poorly or inadequately prepared faculty, (2) essential laboratories require costly equipment and materials, (3) visual aids are a necessity, and (4) each profession is changing so rapidly that faculty knowledge, laboratory equipment, and teaching aids all become obsolete and must be regenerated or replaced.

COURSES

Let's take a fresh look at the field of agriculture subject matter for which we, on our respective campuses, are responsible. We have assumed the responsibility to impart to the students all or a share, depending on the student and his curriculum, of this subject matter. What division and organization of this subject matter into courses would permit the most efficient and effective teaching? I urge that we take a clear, unbiased, and objective look at this problem. I ask that we not let "tradition" or "habit" dictate our answer.

Obviously, no one answer will be the correct answer for all campuses, for all professional areas, or for all time. There are several principles, though, that should guide us.

As Few Units as Possible.

We should break up the subject matter into as few units as possible. This permits you to be more efficient, and probably more effective. Most schools of agriculture are assigned teaching positions by administration on the basis of student enrollment or student credit hours taught, not on the basis of how many different courses are being taught. The more different courses your department teaches, the more different courses you will be teaching, unless your department is extremely large.

One of my years of teaching included teaching all or part of ten different courses. Course proliferation had been permitted to the point that I taught three different introductory animal science courses (for different majors, of varying credit, etc.), two kinds of applied nutrition courses, and two different courses that included livestock marketing. To fulfil the commitment to enrolled students, I was forced to prepare separate outlines, present subjects at varying depths, etc., all of which I could not do adequately because of insufficient time.

It is obvious, too, that if the same kind of subject matter is being offered in two or three different courses, we will likely have more small sections, meaning inefficient and costly operation and or will not be able to offer each course every term.

To be effective as a teacher you must be permitted to develop your courses and your teaching techniques. It takes time. Efficiency afforded by offering as few courses as possible can help provide some of that time.

In obvious contrast to the above statements is the fact that some course proliferation for "special groups and curricula" is justified. It may be necessary, to properly accommodate groups of students, and may not seriously contribute to inefficient operation.

A Planned and Logical Sequence.

Not all will agree with the sequence I will suggest, and for justifiable reasons. I would not advise it for some campuses and for some purposes. It does, though, have merit on many campuses.

Introductory courses. Let's start with the introductory or "principles" courses; that's where the student starts! First, I am convinced there should be an introductory course and that this course should:

(1) **acquaint the student with the field** (such as animal science) and the **proper place of each discipline** within that field (quantitative apprasial and knowledge of population genetics vs. visual appraisal for selection of breeding stock, ruminant nutrition and grazing stock vs. non-ruminant nutrition and grazing stock and raising hogs on concentrates, etc.)

(2) **make the student want to learn** chemistry (so he can master nutrition, want to learn genetics (so he can master the principles of animal breeding), want to learn math (so he can formulate rations with electronic computers), etc. **A taste of the disciplines** within the field, and **recognition of basic sciences** which support them, can be tremendous motivating forces to do well in basic science courses.

(3) **include the principles** the freshman or sophomore student **can comprehend and understand, including** such of these that are **new or recently established** and that are sometimes held back for senior or graduate courses simply because they are new.

The principle of embryo transplanting among cows or ewes, for example, is just as simple to understand as is artificial insemination. The tendency in freshman courses, through, has been to include artificial insemination because it has been practiced since the year 1322, and because it is commonly used on farms, and to leave out embryo transplanting because it was only recently successful and is not commonly used on farms. I submit that **both** should be discussed so the student fully comprehends the **reason** for their use—the reason being to achieve more rapid genetic progress in breeding herds or flocks by using more efficiently the genetically superior animals.

(4) **boil down subjects** that **can** be presented in a complex manner to the **main point**. (I agree that "a little knowledge is a dangerous thing", but a knowledgeable and effective teacher can minimize this risk and maximize the establishment of concepts and principles in the student's mind).
Heritability, for example, is a complex topic to which a semester could be devoted. We don't want beginning students to learn how to calculate heritabilities; we do want them to **understand their significance and usefulness.** They should learn, for example, that to achieve maximum improvement by selection, you must spend selection efforts on traits largely influenced by heredity (those high in "heritability").

There is some danger, in recent attempts to move from the "art" and "husbandry", to develop an introductory animal science course that is almost pure "zoology" (anatomy, physicology, cell biology, and such topics that are common to all animals) or an "industry panorama-economics" course that shows "the importance of the animal industry to the nation's economy and to society". The first tends to overlap a basic and valuable discipline; the second may leave out the taste and flavor—the attractiveness of the subject to 18 to 20 year-old students. Both tend to skirt the basic principles that are the **backbone of and unique to** the animal sciences as they are known today.

Subsequent courses. Courses that follow the introductory courses (animal nurition, animal breeding, soil fertility, etc.) should build upon the principles established in the introductory course. They should not repeat or review. That is the students' responsibility. A suggested arrangement of courses is presented in Table I.

Each course that follows the introductory course should demand comprehension of the appropriate basic science. An instructor is justified in, and perhaps **should,** tell the students in the first class meeting those principles from the introductory course and from the basic science prerequisites that they should understand and comprehend.

If communication between **instructors** of such sequence courses is complete and accurate, students who do not understand and comprehend principles demanded for the latter course should then **assume responsibility for study and review**, and perhaps for seeking faculty assistance. Class presentations, assignments, and examinations in the subsequent course can then be predicated on such understanding and can be more productive and valuable for all students.

As an instructor in "Applied Animal Nutrition," I would feel justified and in fact obligated

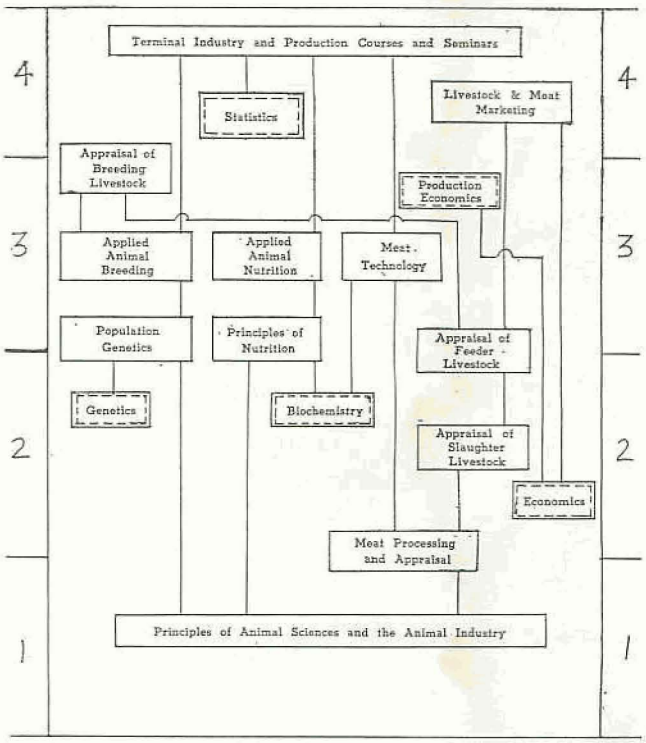

Table 1

to ask discussion questions whose answer must include delineation of knowledge learned in "Principles of Nutrition" and, in some cases, organic chemistry.

For example, the following question might be asked, "Corn now costs 2 cent per pound; you can buy sodium propionate as an alleged energy source for your dairy cows for 1.6 cent per pound. Will you buy and use the sodium propionate?" Principles of Nutrition showed where propionic acid fits into the citric acid cycle, in cellular oxidation, and why it is an efficient energy source; organic chemistry provided understanding of the composition and configuration of propionic acid and the steps for its formation from sodium propionate. Yet, the question is a reasonable and proper one for an Applied Nutrition course.

I have implied in these paragraphs that applied courses (applied nutrition, applied animal breeding, live animal appraisal) follow what I call "principles" courses (principles of nutrition, principles of breeding or population genetics, meat processing and carcass apprasial). The introductory course has already "set the stage" for these disciplines and the basic sciences have provided the "academic footings" on which to build full understanding of the discipline.

As stated before, other sequences may be sound, useful, and advantageous, but I feel this one has particular merit on most campuses.

Terminal courses. Courses that "cap off" or climax an educational experience provide an awesome responsibility to the instructor—a responsibility that may well be **hidden** and **unrecognized** in the tradition and habit of "production" courses that have their roots back in the tens and twenties.

I am **not** suggesting that "production" courses have not changed. They have; well equipped instructors are incorporating appropriate material.

I **am** suggesting, though, that the very nature and, perhaps, the very existence of "production" courses be questioned.

1. Help the student **analyze** problems and **identify** profit bottlenecks in a production enterprise or a processing or service industry (meat processing, credit agency, etc.) and **chart** solutions that will solve the problems and eliminate the bottlenecks.
2. Build **confidence** in the student to **use** his technical knowledge and reasoning ability.
3. **Familiarize** the student with **current and anticipated industry trends** opportunities, and the factors which cause these.

We need to take a fresh look at terminal courses. Again, try to assume for a moment that we don't have any. We just have a crop of new seniors in a School of Agriculture who are ready for the educational climax in their major field. What courses do they need? Here are some alternatives:

(1) Offer only "advanced" courses in each discipline within the field—in Animal Science, advance courses in nutrition, breeding, marketing, milk secretion, etc.

(2) Offer "production" courses in as few numbers as possible, grouping enterprises or species where possible. In Animal Science, this might mean three such courses—(a) confinement feeding operations (hogs, chickens, turkey, cattle, lambs), (b) pasture and range operations (cow herds, stocker cattle, and ewe flocks), and (c) milk production.

(3) Offer one or more "current and special topics" courses built around producer's, processor's or service industry manager's questions, case histories, and visited enterprises, perhaps including all kinds of operation.

(4) Offer one or more seminars and or discusion courses built around technical journals and trade journals.

(5) Offer one course in "production" and one on "related industries". This would apply specifically to commodity oriented departments. The "related industries" course in Animal Science, for example, would include topics peculiar to feed, meat processing, and livestock equipment companies; markets; etc. I sincerely hope you can add to this list of alternatives.

Terminal courses can be organized and administered in a variety of effective ways—seminars, lecture-recitation-lab, problem-solving, letter answering, field trips and outside speakers, etc.

The same principles should apply for students entering previous courses. In other words, they should be **ready** for the course. Readiness may not always be realistic to require a certain number of credits in the field for entry. This permits non-major's to use the courses profitably.

SUMMARY

Our first goal in course and curriculum development is that both courses and curriculum permit **effective** learning and maturation of the student. (Courses and curriculum structure can only permit this to happen; top-quality faculty will cause it to happen.) A second goal is to be **efficient** in our operations.

A factor which sometimes strongly influences courses and curricuulm judgements and decisions, is the desire or willingness to retain the established patterns—the status quo, the habit and tradition, that which "has produced many good men", that which "we've liked for many years," etc. By this statement I am not suggesting that we should turn back on all that is good or change all that is established. I am emphasizing, through, that the desire or willingness to retain the established patterns **should not** be a goal in **course** and curriculum development.

UNITY IN LANDSCAPE DESIGN

From: "Garden Diggin's"

A weekly newspaper column by

John Wright

Unity is defined as: "state of being one; singleness; absence of diversity. Unification. A totality of related parts; a complex or systematic whole."

In bringing together a diversity of materials in the landscape, one should strive to achieve unity. It is true that we enjoy variety but someone has made a slogan, "Variety in Unity" or we could say **unity**—the foundation with variety developing from it. Many persons set out with no purpose in mind in their planting, except to amass a collection of plants. The very fact that there is no purpose makes it difficult, if not impossible, to achieve unity. "Unity, results from the strength of clarity of a single and motivating idea." Perhaps you want a traditional effect, a tropical feeling, an oriental influence, or a modern look—anyone of these ideas can be the beginning of achieving unity.

When materials are combined in the landscape (both plant an non-living materials) the elements of design—**line, form, pattern, color** and **texture**— become unifying forces. Color is especially useful in relating different species of plants and in relating plant material to non-living materials.