Republika ng Pilipinas
(Republic of the Philippines)
MINISTRI NG EDUKASYON AT KULTURA
(MINISTRY OF EDUCATION AND CULTURE)
Maynila
(Manila)

TANGGAPAN NG MINISTER
OFFICE OF THE MINISTER

April 24, 1981

MEC O R D E R
No. 24, s. 1981

MINIMUM STANDARDS FOR BACHELOR OF AGRICULTURAL TECHNOLOGY (B.A.T.)
(A Ladder-type Curriculum)

TO: Bureau Directors
Regional Directors
Presidents, State Colleges and Universities
Heads of Private Schools, Colleges and Universities

1. This Office, cognizant of the urgent need for a technician-oriented agricultural education curriculum which shall be offered as an alternative to the existing science-oriented agricultural programs, has approved the inclosed minimum standards for the four-year ladder type Bachelor of Agricultural Technology (B.A.T.) program, as recommended by the Technical Panel for Agricultural Education (TPAE).

2. The standards have been evolved after a series of consultative meetings and workshops with school heads and participants from both the government and the private sectors, who will eventually be the end-users of the program.

3. The first two years of the program shall lead to the title of Associate in Agriculture (A. Agr.) while the last two years shall lead to the degree of Bachelor of Agricultural Technology (B.A.T.)

4. The NCEE requirement shall be mandatory for admission for all students into the four-year B.A.T. program. Students who have not qualified in the NCEE shall be limited to the two-year A. Agr. program only, without prejudice for them to proceed into the four-year B.A.T. program after having qualified in the NCEE and satisfied other pertinent admission requirements of the institutions concerned.

5. For a more systematic implementation of the various programs, the effectivity of the prescribed standards shall be on staggered basis as follows:

Curriculum Year	School Year
First	1981-82
Second	1982-83
Third	1983-84
Fourth	1984-85

6. It is desired that this Order be given the widest publicity possible.

ONOFRE D. CORPUZ
Minister of Education and Culture

Incl.:
As stated

Reference:
MEC Order: No. 4, s. 1981

Allotment: 1-3-4--(D.O. 1-76)

To be indicated in the Perpetual Index under the following subjects:

CURRICULUM
EXAMINATION
PROGRAM, SCHOOL
VOCATIONAL EDUCATION

MINIMUM STANDARDS FOR BACHELOR OF AGRICULTURAL TECHNOLOGY

MEC ORDER NO. 24, S. 1981

PREPARED BY THE

TECHNICAL PANEL FOR AGRICULTURAL EDUCATION
BUREAU OF HIGHER EDUCATION
MINISTRY OF EDUCATION AND CULTURE

GUIDING PRINCIPLES AND MINIMUM STANDARDS FOR A BACHELOR OF AGRICULTURAL TECHNOLOGY (B.A.T.) PROGRAM (A Ladder-type Curriculum)

I. GUIDELINES

A. Curriculum objective

The program aims to equip technicians and professionals with abilities needed to make practical applications of theoretical knowledge and develop entry-level occupational proficiency in clusters of jobs in agriculture.

B. Programs

1. Instruction/curriculum

The curriculum should have a well-balanced general education and technical courses aimed at developing students physically, mentally, socially and morally.

The curriculum is a ladder-type transfer program that would allow a two-year associate graduate to enroll in the last 2 years of the B.A.T. program, only after fulfilling the MEC admission requirements. The first two years of the program shall lead to the title of Associate in Agriculture (A. Agr.). The last two years of the program shall lead to the degree of Bachelor of Agricultural Technology (B.A.T.).

Accreditation of the skills gained through non-formal agricultural experiences of students may be done by the school after validating or passing an examination either in the A. Agr. or the B.A.T. programs.

2. Agricultural Production and Community Services

To support the A. Agr. and B.A.T. instructional programs the institution should undertake agricultural production activities and community services.

C. Resources

1. Faculty

There should be a minimum number of qualified instructors to handle courses in the A. Agr. and B.A.T. programs.

2. Student

The institution should adopt an admission policy which should provide equal access to students from lower income groups without sacrificing academic standards.

A student who passed the NCEE may enroll in the straight B.A.T. program and may be awarded the title of A. Agr. and the B.A.T. degree upon completion of their respective requirements. A student who has not passed the NCEE can enroll only in the A. Agr. programs and awarded the title after completing the requirements. If he so desire to seek further training, he may be admitted in the B.A.T. program only after passing the NCEE and fulfilling other admission requirements of the institution.

3. Physical facilities and equipment

The existence of adequate facilities and equipment is a prerequisite to insure the offering of a quality training program in occupational agriculture.

D. Organization

The program and resources of the institution for the B.A.T. should be organized in such a way that the instructional, production and community service activities could be carried out in an integrated manner.

E. Quality of output

Each institution offering the Associate degree curriculum should institute a certification of job entry-level skills acquired by the students prior to the granting of the A. Agr. title. Similarly, at the Bachelor's degree level, each student should be able to

demonstrate higher level of practical and managerial skills in the major area of interest prior to graduation.

To promote quality of output, the institution should have a mechanism to assist in the job placement of graduates and to follow-up their performance and career pattern.

II. MINIMUM STANDARDS

A. Programs

1. Instruction/curriculum

a. The associate curriculum should have a minimum of 82 units composed of 33 units of general education and 49 units of technical agriculture courses including practicum. The technical agriculture courses should be distributed proportionally in the areas of animal production, crop production and agribusiness/management.

b. The minimum credit required for the Bachelor of Agricultural Technology degree program including the units earned in the 2-year associate program, is 147 units. An additional 27 units of general education and 38 units of technical agriculture including internship are required beyond the A. Agr. program.

c. The maximum faculty-student ratio is 1:20 in both levels using the full-time equivalent (FTE) for teaching as basis.

d. Budget should be allocated in such a way that out of the allotment for instruction, at most 60% is allocated for salaries and other personal services and at least 40% is allocated for maintenance and operating expenses and equipment.

2. Production, field practice and community service

Funds and facilities must be provided by the institution to effectively carry out its production, field practice and community service activities.

Funding for these instruction-related activities may come from internal and/or external sources.

Field projects and community service should be undertaken to meet the development needs of the service area of the school as well as to strengthen the instructional program and make it more relevant. This will insure that the institution has faculty members specializing in at least the primary phase of agriculture-production, processing and marketing.

B. Resources

1. Faculty

Exclusive of the general education faculty, the following are required:

a. A minimum of 8 full-time faculty members with practical experience and training to teach in the associate program whose fields of specialization are distributed among crop production, animal production, agribusiness/agricultural economics, agricultural engineering and soil technology.

b. In addition, a minimum of 4 full-time faculty members with practical experience and advanced training shall be required for the B.A.T. program. At least one of the staff should have competence in food handling/ processing and/or post-harvest technology.

c. At least 3 out of 12 full-time faculty members should have an advanced degree/training in their fields of specialization to handle the B.A.T. program.

2. Land

There should be a minimum of 30 hectares specifically used for instruction, production and farm demonstration in the 2-year associate program. A minimum of 50 hectares should be provided for instruction, production and farm demonstration for the B.A.T. program.

3. Physical facilities and equipment

a. Building requirements

1) School buildings should comply with appropriate zoning and building regulations.

2) The laboratory floor space should be 2.3 sq. m. per student.

3) The classroom floor space should be 1.5 sq. m. per student.

4) Circulation should be approprimately 30% of the sum of the areas of all teaching accommodation (including storage), library, communal administrative and other facilities.

b. Minimum laboratory and field equipment and facilities for instruction and production. (See Annex F)

1) Crop Production
2) Animal Production
3) Biology Laboratory
4) Physics/Chemistry Laboratory
5) Farm Mechanics
6) Food handling/processing/Post-harvest technology
7) Arboretum - 1 hectare should be allocated

c. Library

1) The library seating capacity should be 10% of the combined total of students and academic staff.

2) For the Associate program:

A minimum of 2 book titles (less than 10 years old) per subject for the general education and technical agriculture courses.

For the Bachelor's degree program:

A minimum of 3 book titles (less than 10 years old) for each of the additional subjects.

3) A minimum of 2 technical journals (current) for each of the technical agriculture subjects should be available.

d. Support services

1) Health services

There should be an adequate functional medical and dental clinics for students, staff and their dependents.

2) Student, personnel and placement services

There should be adequate student accommodation, food service, recreational facilities, and counselling and graduate-placement services.

C. Organization

It should have a built-in system for planning, implementation and evaluation of its program.

Annex A

A Ladder-type Agricultural Technology Program
Leading to the title of Associate in Agriculture (A. Agr.)
(first two years) and the degree of Bachelor of Agricultural Technology
(B.A.T.) (last two years)

	Courses	Units[1] A. Agr.[2]	B.A.T.
I	General Education		
	Humanities[3]	9	21
	Social Sciences[4]	12	
	Natural Sciences	12	3
	Rizal Course		3
		33	27
II	Technical Agriculture		
	Philippine and Asian Agriculture	3	
	Crop and Livestock Improvement		3
	Animal Production Technologies	9	6[5]
	Crop Production Technologies	9	6[5]
	Agricultural Engineering	6	
	Management	6	5
		33	20
III	Practicum in Agriculture	16	
	Occupational Internship		18
		82 +	65 = 147

1/ 1 unit credit is equivalent to 1 hour per week of lecture and/or recitation in a semester; or 3 hours per week of laboratory work.

2/ Certification of skills is required before the title of Associate in Agriculture is awarded.

3/ Includes Pilipino and Spanish as prescribed by law; the Spanish courses (12 units) required by law shall be requested for exemption for this program. This program aims to produce graduates who would be agricultural practitioners in the Philippine villages and would not need Spanish.

4/ Excludes other MEC prescribed courses.

5/ Specialized option in Technical Agricultural depending upon students' interest.

Annex B

List of Prescribed Courses as Categorized in Annex A.

Courses	Units	
	A. Agr. (First 2 years)	B.A.T. (Last 2 years)
I General Education		
Humanities		
a. English I (Essentials of Oral and Written Communication)	3	
b. English II (Communication Skills)	3	
c. English III (Philippine Literature)		3
d. English IV (Technical Reporting)		3
e. Pilipino (Sining ng Pakikipagtalastasan)	3	
f. Pilipino II (Poklorikong Pilipino)		3
g. Spanish I - IV (Elementary and Intermediate Spanish)		12
Social Sciences		
a. Social Science I (General and Agricultural Economics)	3	
b. Social Science II (Human and Personal Relations)	3	
c. Social Science III (Philippines Society and Institutions)	3	
d. Social Science IV (Rural Sociology and Agricultural Extension)	3	

	A. Agr.	B.A.T.
Natural Sciences		
a. Agricultural Biology	3	
b. Agricultural Chemistry	3	
c. Farm Physics	3	
d. Mathematics	3	
e. Practical Statistics		3
Rizal Course		3
II Technical Agriculture		
Philippine and Asian Agriculture	3	
Crop and Livestock Improvement		3
Animal Production Technologies		6 1/
a. Poultry Production and Management Practices	3	
b. Swine Production and Management Practices	3	
c. Ruminant Production and Management Practices	3	
Crop Production Technologies		6 1/
a. Field Crops and Cereal Production	3	
b. Horticultural Crops Production	3	
c. Soil and Fertilizers	3	

1/ An option is given to the student to take either 6 units of Animal Production and 6 units of Crop Production or 12 units of either Animal or Crop Production courses depending upon his interest and plans. A list of suggested courses is shown in Annex C.

		A. Agr.		B.A.T.	
	Agricultural Engineering				
	a. Agricultural Mechanics	3			
	b. Irrigation and Drainage	3			
	Management				
	a. Farm Business Management	3			
	b. Project Evaluation and Analysis	3			
	c. Agricultural and Business Finance			3	
	d. Agricultural Management			2	
III	Practicum in Agriculture[2/]	16			
	Occupational Internship[3/]			18	
	TOTAL	82	+	65	= 147

2/ This course of instruction of Supervised Practical experience is a graduation requirement in the A. Agr. program, to be taken on and/or off campus farms and projects during the second semester of the second year. The practicum should provide for the development and improvement of selected agricultural skills/ competencies for certification and/or entrance to occupation. A bank loan may be tapped to support this practicum and may be continued until graduation. This course will also prepare students going through the B.A.T. program for success during occupational internship.

3/ Occupational Internship is a graduation requirement in the B.A.T. program. It consists of a minimum of 640 hours of semestral work as an intern/employee of a public or private firm or agency which will support the student's specialized field of study or interest. During this period the student pays fees, enrolls for credit, receives grades, is supervised by the teacher and if possible be paid a salary as an employee. Another option is for the student to establish his own agricultural enterprise through bank loans or other forms of financial support. He will also be assisted by the school and made to submit an internship report.

Annex C

List of Optional Courses for Crop and Animal Production Technologies that may be taken to complete 12 units B.A.T requirements

1. Animal Production Technologies (6 or 12 units)

   - Animal Nutrition
   - Animal Breeding
   - Dairy Production and Processing
   - Meat Technology
   - Animal Health and Sanitation

2. Crop Production Technologies (6 or 12 units)

   - Cropping Systems
   - Plant Propagation and Nursery Management
   - Forage and Pasture Management
   - Crop Processing and Post-harvest Technology
   - Crop Protection

Annex D

BACHELOR OF AGRICULTURAL TECHNOLOGY (B.A.T.)
Sample Curriculum

FIRST YEAR

First Semester

Subjects	Units	
English I	3	
Pilipino I	3	
Social Science I	3	
Agricultural Biology	3	
Field Crops and Cereal Production	3	
Poultry Production and Management Practices	3	
CMT	(1.5)	
P.E.	(2)	18

Second Semester

English II	3	
Social Science II	3	
Agricultural Chemistry	3	
Farm Physics	3	
Agricultural Mechanics	3	
Horticultural Crops Production	3	
CMT	(1.5)	
P.E.	(2)	18

Summer

Mathematics	3	
Philippine and Asian Agriculture	3	
Farm Business Management	3	9

SECOND YEAR

First Semester

Subjects	Units	
Social Science III	3	
Social Science IV	3	
Swine Production and Management Practices	3	
Ruminant Production and Management Practices	3	
Soil and Fertilizers	3	
Irrigation and Drainage	3	
Project Evaluation and Analysis	3	
CMT	(1.5)	
P.E.	(2)	21

Second Semester

Practicum	16	
CMT		
P.E.		

Total Units - 82

THIRD YEAR

First Semester

Subjects	Units	
Pilipino II	3	
English III	3	
Spanish I	3	
Practical Statistics	3	
Crop and Livestock Improvement	3	
Animal Production (Major)	3	18

Second Semester

English IV	3	
Spanish II	3	
Rizal Course	3	
Animal Production (Major)	3	
Agricultural Management	2	
Crop Production (Major)	3	17

Summer

Spanish III	3	
MEC prescribed course	( )	3

FOURTH YEAR

First Semester

Subjects	Units	
Spanish IV	3	
Agricultural and Business Finance	3	
Crop Production (Major)	3	
MEC prescribed courses	( )	9

Second Semester

Occupational Internship	18

Total Units - 147

Annex E

Description of Courses in the Agricultural Technology Curriculum

I. General Education

Humanities

Essentials of Written and Oral Communication - 3 units, 3 hours a week (class). Surveys the components and functions of written and oral communication and provides practice in applying effective written and oral skills to informal and job related situations.

Communication Skills - 3 units, 3 hours a week (class). Instruction and practice intended to develop the student's ability to listen, read, speak and write.

Philippine Literature - 3 units, 3 hours a week (class). Study of literary types; fiction, poetry, drama, essay and biography of contemporary Filipino writers. Further development of communication skills shall be integrated in the discussions.

Technical Reporting - 3 units, 3 hours a week (class). Techniques of collecting, organizing, preparing and presenting pertinent technical data in agriculture by means of informal and formal reports, forms, procedures, and technical papers.

Pilipino I - Sining ng Pakikipagtalastasan. 3 units, 3 hours a week (class). Mga paraan sa pakikipagtalastasan o pagpapahayag. Paglalarawan, pagsasalaysay, paglalahad at pangangatuwiran.

Pilipino II - Poklorikong Pilipino. 3 units, 3 hours a week (class). Panimula sa Poklorikong Pilipino.

Spanish I - Elementary Spanish - 3 units, 3 hours a week (class). Intensive practice in conversational Spanish on elementary level. The work consists entirely of the oral aspects of language study, pronunciation, vocabulary building, reading aloud, comprehension of the spoken language, and conversation. Functional grammar is given to the students to serve as guide in the formation of correct speech habits.

Spanish II - Elementary Spanish - 3 units, 3 hours a week (class). The essentials of grammar, with special emphasis on idiom, are treated in this course. Emphasis is placed on reading, dictation, conversation and short composition. Opportunities are provided for the application of all the language skills acquired previously.

Spanish III - Intermediate Spanish - 3 units, 3 hours a week (class). An intensive review of Spanish grammar with special emphasis on advanced principles. Translation and free compositions to enable the students to acquire fluency in the written language.

Spanish IV - Intermediate Spanish - 3 units, 3 hours a week (class) This course introduces various types of written works in Spanish by Filipino writers from the end of the past century to the present. The study covers the development of ideas of nationalism or devotion to national unity and independence and its defense.

Social Sciences

General and Agricultural Economics - 3 units, 3 hours a week (class). Study of economic principles applied to agricultural production to include production principles; relationship of supply, demand, and price of commodities; economic terms affecting farm management, e.g. diminishing marginal returns, interest, discount, economies of scale.

Human and Personal Relations - 3 units, 3 hours a week (class). Study of individual growth and human behavior and the establishment of meaningful human relationship.

Philippine Society and Institutions - 3 units, 3 hours a week (class). Study of Filipino group interactions (man's relationship with others), the organization of social groups, impact of groups on social action and the Filipino rural institutions and cultural values.

Rural Sociology and Agricultural Extension - 3 units, 3 hours a week (class). Study of the organization of rural communities in the Philippines, structure of rural populations, rural mobility, rural depopulation; problems of rural development as it relate to the principles and practices of extension education and agricultural technology transfer.

Natural Sciences

Agricultural Biology - 3 units, 5 hours a week (2 class, 3 lab.). Study of simple plant and animal cells to highlight basic differences in organization and function; a consideration of the fundamentals of plant and animal anatomy and physiology in so far as these are relevant to agricultural production, e.g. photosynthesis, transpiration, translocation, tropisms, and reproduction and propagation of plants; digestion, reproduction and thermoregulation in farm animals.

Agricultural Chemistry - 3 units, 5 hours a week (2 class, 3 lab.). Study of basic concepts and general principles of chemistry applied to agricultural production which includes solution calculation, pH, buffers, redox, and those aspects of organic and biochemistry pertaining to agriculture.

Farm Physics - 3 units, 5 hours a week (2 class, 3 lab.). Study of the general principles of physics applied to agriculture and the operations in the farm.

Mathematics - 3 unit, 3 hours a week (class). Study of mathematica computations, conversions, calculations, and measurements common to the field of agriculture and operations in the farm.

Practical Statistics - 3 units, 3 hours a week (class). Study of elementary statistical concepts and methods used in describing and understanding data from research and organizing them for popular use.

Rizal Course - 3 units, 3 hours a week (class). Study of the life and works of Rizal and the contemporary Philippines.

II. Technical Agriculture

Philippine and Asian Agriculture - 3 units, 3 hours a week (class). Study of Philippine climate and its effects on agriculture, land use and farming systems, types of farm products, organization of agriculture and regional variations in the Philippines and other Asian Countries.

Crop and Livestock Improvement - 3 units, 5 hours a week (2 class, 3 lab.). Study of principles and practices applied to the development, evaluation and maintenance of improved crop plants and farm animals.

Crop Production Technologies

Field Crops and Cereal Production - 3 units, 5 hours a week (2 class, 3 lab.). The study of the adoption, cultural practices, harvesting, post harvest care and cost analysis for producing the major field crops in the provinces.

Horticultural Crops - 3 units, 5 hours a week (2 class, 3 lab.). The study and application of the various practices in growing, processing and marketing horticultural crops with emphasis on those within the service area.

Soil and Fertilizer - 3 units, 5 hours a week (2 class, 3 lab.). The study of the function, development and conservation of soil; its physical, chemical, biological and mechanical properties; the effects of cultivation upon soils and types, functions of fertilizers.

Animal Production Technologies

Poultry Production and Management Practices - 3 units, 5 hours a week (2 class, 3 lab.). Study of the incubation and management of fertilized eggs, rearing of replacement breeding stock, the husbandry and management of the commercial poultry flock for meat and egg production, and the factors affecting the efficiency and profitability of poultry production.

Swine Production and Management Practices - 3 units, 5 hours a week (2 class, 3 lab.). Study of the breeding, husbandry and management of replacement breeding stock; the breeding of sow and the rearing of piglets to weaning, the growing of pigs for pork and bacon production; and the factors influencing the feed conversion efficiency, carcass quality and profitability of swine enterprise.

Ruminant Production and Management Practices - 3 units, 5 hours a week (2 class, 3 lab.). Study of the breeding, husbandry and management of carabaos, cattle and goats under backyard and commercial conditions for milk, meat and/or draft.

Animal Nutrition - 3 units, 5 hours a week (2 class, 3 lab.). Study of the nutrient needs of farm animals and other livestock for maintenance, growth, reproduction and lactation; simple feed analysis and their relation to the nutrient content of feedstuffs.

Animal Breeding - 3 units, 5 hours a week (2 class, 3 lab.). Study of the principles of inheritance, variability, selection and improved breeding of farm animals.

Dairy Production and Processing - 3 units, 5 hours a week (2 class, 3 lab.). Study of dairying including elementary elements of selection, feeding, breeding, disease control, milk production and processing and management practices.

Meat Technology - 3 units, 5 hours a week (2 class, 3 lab.). Study of the meat processing industry including procurement of the live animal, slaugthering, cutting and curing and processing, packaging, retailing and the nutritive value of meat items.

Animal Health and Sanitation - 3 units, 5 hours a week (2 class, 3 lab.). Study of the hygienic principles and practices in improving health and the prevention of common diseases of farm animals.

Agricultural Engineering

Agricultural Mechanics - 3 units, 5 hours a week (2 class, 3 lab.). Study of the use and maintenance of farm tools, equipment, machinery and structures for production and processing.

Irrigation and Drainage - 3 units, 5 hours a week (2 class, 3 lab.). Study of planning, selection, design and construction of structures used for erosion control, irrigation, and drainage of agricultural lands, and water management practices in agricultural production systems.

Management

Farm Business Management - 3 units, 5 hours a week (2 class, 3 lab.). Study of the organization and management of the farm production units; planning the cropping and stocking of a farm; choice and complementation of farm enterprises; a keeping simple farm records and accounts.

Project Evaluation and Analysis - 3 units, 3 hours a week (class). Study of the concepts, procedures and mechanics of conducting feasibility studies; evaluation and analysis of indicators, projects and similar agricultural enterprises for development.

Agricultural and Business Finance - 3 units, 3 hours a week (class). Study of formulating and using a simple budget; identification and utilization of sources of funds; and laws related to financing agricultural projects.

Agricultural Management - 2 units, 2 hours a week (class). Study of the basic management principles with emphasis on the managerial functions of planning, organizing, directing, coordinating and controlling agricultural production and processing activities.

Practicum in Agriculture - 16 units to be taken in 640 hours during the second semester of the second year. An on or off - campus supervised practical experience supported with bank loans or other forms of financial support for the development and improvement of selected agricultural skills.

Occupational Internship - 18 units to be taken in 640 hours during the second semester of the last year. It consists of a semestral work as an intern/employee of a firm or agency which supports the student's specialized field of study. Other option is for a student to establish his own agricultural enterprise through bank loans or other forms of financial support. He will also be assisted by the school and made to submit an internship report.

BASIC LABORATORY AND FIELD EQUIPMENT AND FACILITIES[1/]

Laboratory Facilities/Equipment	Quantity
A. Agricultural Biology Laboratory	
1. Commonly used glassware such as beakers, flask, graduated cylinders, testtubes, pipettes, volumetric flasks, burettes, funnels, various sizes	One set for every 4 students/class
2. Microscope, compound	15 units
3. Watch glass	One for every 2 students/class
4. Glass slides and cover slips	15 units
5. Dissecting set	15 units
6. Evaporating dish	10 units
7. Hand lens	15 units
8. Iron stand and rings	15 units
9. Medicine dropper	15 units
10. Mortar and pestle	15 units
11. Thermometer, Laboratory	10 units
12. Wide-mouth jar	10 units
13. pH papers (several pH units)	1 unit
14. Seed moisture tester	1 unit
15. Plant presses, 43 x 280 mm frame	30 units
16. Range or prepared microscopes slides covering plant and seed anatomy, fertilization, cells, etc.	1 set
17. Petri dishes (filter paper)	1 unit
18. Drying oven	1 unit

1/ This listing is in accordance with basic equipment needed in the B. A. T. courses for laboratory and fieldwork activities to allow each student to use the q equipment.

		Quantity
19.	Light meter	1 unit
20.	Refrigerator	1 unit
21.	Torsion balance (more sensitive balance)	1 set
22.	Growth chamber with heater thermostat to 30°C (to be fabricated)	1 unit
23.	Collections/Specimens	
	a. pests	
	b. diseases	
	c. weeds	
	d. seeds	
	e. crops/products	
	f. animals, birds, etc.	
	g. living plants (potted)	
24.	Teaching charts	
25.	Chemicals	Assorted
26.	Rubber tubings, stoppers (corks or rubber)	
27.	Capillary tubings	
28.	Stirrer	
29.	Gas	
30.	Bunsen burner, wire gause, tongs	15 units

B. Physics/Chemistry Laboratory

		Quantity
1.	Assorted glassware such as beakers, flask, graduated cylinders, test tubes, glass tubing	One set for every 4 students/class
2.	Distilling apparatus set	1 set
3.	Bunsen burners	10 units
4.	Weighing scale, 1600 gm. capacity with weights	1 unit
5.	pH meter	1 unit
6.	Furnace/autoclave	1 unit
7.	Mortar and pestle	15 units
8.	Crucible tongs	6 units
9.	Lab. Thermometer	10 units
10.	Iron stand and rings	15 units
11.	Analytical balance	1 set
12.	Soil auger, screw type	10 units
13.	Soil analysis kit	1 unit
14.	Soil color charts	1 unit
15.	Assorted chemicals	
16.	Burette, acid, 50 ml base, 50 ml.	10 units 10 units
17.	Burner, alcohol	15 units
18.	Clamp iron and holder	1 set
19.	Conductivity apparatus	1 set
20.	Electrolysis apparatus	1 set
21.	Medicine dropper	15 units
22.	Stirring rods	15 units
23.	Paraffin wax	10 units
24.	Ammeter	2 units
25.	Barometer, Aneroid	1 unit
26.	Barometer, Mercurial	1 unit
27.	Platform balance	10 units
28.	Balance, Spring	10 units
29.	Battery, wet and dry cell	2 units
30.	Thermos bottle	

b. Horticulture Laboratory		Quantity
1.	Nursery area with tools, equipment and working shed	At least 1,000 sq. m.
2.	Wheelbarrow	4 units
3.	Garden trowel	15 units
4.	Gas mask	15 units
5.	Knapsack sprayer	4 units
6.	Rakes	2 units
7.	Light hoe	15 units
8.	Shovel	15 units
9.	Spading fork	15 units
10.	Polyvinyl hose ½" dia.	2 sets
11.	Sprinkler	5 units
12.	Drain Spade	4 units
13.	Weighing scale (50 kilos cap.)	1 unit
14.	Pruning shears	5 units
15.	Pruning saw	10 units
16.	Budding knives	10 units
17.	Grafting knives	10 units
18.	Seed moisture tester	1 unit
19.	Mist house (chamber)	1 unit
20.	Established orchard for instructional purposes	1 hectare
21.	Platform balance	2 units

		Quantity
31.	Compass	10 units
32.	Convection box	6 units
33.	Electroscope	6 units
34.	Galvanometer	6 units
35.	Metal plates and rings	6 units
36.	Meter stick	15 units
37.	Micrometer caliper	2 units
38.	Prism, flint glass	10 units
39.	Soldering rod	1 unit
40.	Stop watch	10 units
41.	Thermometer, dry and wet bulb	10 units
42.	Vernier caliper	2 units
43.	Volt meter	10 units
44.	Wire gauge	15 units
45.	Wide-mouth jar	10 units
46.	Sets of Magnets	6 units
47.	Sets of tuning forks	6 units
48.	Volumetric flask (500 & 1000 ml. cap.)	1 set for every 4 student/class
49.	pH paper (pH unit 1-14)	1 set for every 4 student/class
50.	Spot plate (soil testing, pH test, etc.)	1 set for every 4 student/class
51.	Clamps, iron ring, wire gauge burette clamps, tongs, test tube holders	1 set for every 4 student/class
52.	Hot plate	4-5 units
53.	Teaching charts & diagrams	Several set
54.	Periodic table (clerical element)	1-2 unit
55.	Gas	
56.	Crucibles	10-15 units
57.	Buffers (pH) & color indicators	1-2 set/class

Post Harvest Processing (includes Meat Processing) Laboratory

		Quantity
1.	Sulphuring kiln and cabinet for pretreatment of dehydrated fruits (to be fabricated)	1 unit
2.	Cabinet-dryer, kiln types for dehydrating fruits and vegetables (to be fabricated)	1 unit
3.	Solar drying racks (to be fabricated)	4 units
4.	Food preparation utensils, assorted	2 sets
5.	Weighing scales, 1000 gm. cap.	2 sets
6.	Refrigerator, 10 cu. ft.	1 unit
7.	Slaughtering tools /- 1 set includes 1 sharpening steel, 2 pcs. carborundum, 1 cleaver, 2 sticking or bleeding knives, 2 skinning knives, 6 butcher or ordinary knives, 1 manual meat saw, 1.5 tons capacity hoist, 1 meat pump -/	2 sets
8.	1 chest type freezer, electric or gas fed	1 unit

II Farm Mechanics Shop Equipment

1.	C-clamps, assorted sizes	1 set
2.	Chisels, Butt and Cold types, assorted sizes	1 set each
3.	Cutter, general purpose	3 units
4.	Differential chain hoist, 1 ton cap.	1 unit
5.	Drill, Breast	3 units
6.	Drill, Hand	3 units
7.	Files, triangular, assorted sizes	1 set
8.	Files, square, assorted sizes	1 set
9.	Gantry "A" Frame	1 unit
10.	Hacksaw, with Blade replacements	3 units
11.	Hydraulic Service Jack	1 unit
12.	Level Aluminum, Die Cast	3 units
13.	Oil stone, General Purposes	3 units
14.	Planes, assorted types	3 units each
15.	Pipe cutters	1 unit
16.	Ratchet Threader, Drop head	1 unit

		Quantity
17.	Rivet punch and Riveter	1 unit
18.	Ruler, Universal, 6 ft. folding	6 units
19.	Pliers, assorted types and sizes	6 units
20.	Soldering Gun Kit	1 unit
21.	Saw, assorted types and sizes	1 set each
22.	Tin snips	6 units
23.	Vise Wood workers	4 units
24.	Wrenches, Adjustable assorted types and sizes	1 set each
25.	Screw Driver Set, Philips and Mechanics Round	1 set each
26.	Tractor tire gauge	1 unit
27.	Welding set, electric or oxy acetylene with welder's helmet	1 unit
28.	Blacksmith tongs, assorted sizes	1 set
29.	Cast steel anvil	2 units
30.	Chain pipe vise, 15"	1 unit
31.	Hammers, Ballpeen, Blacksmith, etc. assorted sizes	1 set each
32.	Plump sledge hammer, 6 head	1 unit
33.	Irrigation pump	1 unit each
34.	Crowbar	6 units
35.	Claw bar	6 units
36.	Digging bar (locally made)	6 units
37.	Two-stroke cycle, internal combustion engine (not in running condition)	1 unit
38.	Four-stroke cycle, internal combustion engine (not in running condition)	1 unit

III Visual Aids/Collections/Specimens/Model

		Quantity
1.	Pests, diseases and animals	At least one representative each
2.	Diseases, plants and animals	"
3.	Weeds	"
4.	Seeds	"
5.	Crops	"
6.	Soil profiles	"
7.	Crop products	"
8.	Poultry/livestock models	
9.	Slide projector with accessories	1 unit
10.	Overhead projector set	1 unit

IV. Field Facilities/Equipment

	Quantity
A. Crop Production Technologies	
1. 4 wheel tractor, small to medium size, with attachments (disk/ mould plow, harrow, furrower, and rotavator, cage wheel)	1 unit
2. Hand tractor (6-10 hp) for wetland and dryland preparations with attachments (mould board plow, furrower, rotavator, cage wheel, trailer)	2 units
3. Native plow	1 unit
4. Native harrow	1 unit
5. Pick-up Truck	1 unit
6. Sprayer (knapsak/cylindrical)	3 units
7. Sets of Safety equipment (headgear, goggles, gloves, rubber boots, respirators, etc.)	6 sets
8. Shovel, spade, spading forks, hoe and rakes	15 each
9. Wheel barrow	7 sets
10. Steel tape (100 meters)	2 sets
11. Spring balance (25 and 30 kgm. cap.)	2 units
12. Weighing scale (30 kg. cap.)	1 unit
13. Triple beam balance (2-3 kg. cap.)	1 unit
14. Water Sprinklers (8-10 liters cap.)	10 units
15. Hand counter	10 units
16. Draft Animal	2 animals
17. Power Thresher (grains & field legumes)	1 unit
18. Seed blower	2 units
19. Rotary weeders	15 units
20. Pick mattock	15 units
21. Corn sheller	1 unit
22. Grain dryer	1 unit

B. Animal Production Technologies

1. POULTRY PRODUCTION

a. Egg Production (600 layers)

	Quantity
1. Multidose syringe, 50 cc.	1 unit
2. Automatic syringe filler	1 unit
3. Laying cages with feeder and waterer 4 layers per cage (locally made)	150 units
4. Egg grader (small-medium) and candler	1 unit
5. Weighing scale, 50 kilos cap.	1 unit
6. Egg basket	2 units
7. Shovel (square point)	2 units
8. Egg tray (locally made)	50 pcs.
9. Wheel barrow	1 unit
10. Electric brooder, 4 lamp	1 unit
11. Laying house with water, electrical facilities and feed room (600 cap.)	1 unit
12. Brooding/growing house	1 unit
13. Layers	600 heads

b. Broiler Production (1000 heads)

	Quantity
1. Shovel (square point)	2 units
2. Plastic pail, 5 gal. capacity	2 units
3. Weighing scale, 50 kls. capacity	1 unit
4. Plastic waterer, ½ gal. cap.	12 units
5. Plastic waterer, 1 gal. capacity	12 units
6. Syringe with needle, 50 cc.	2 units
7. Compressed air sprayer or flame sprayer	1 unit
8. Eleetric brooder, 4 lamp	2 units
9. Triangular feeding trough 6" x 6" x 12"	14 units
10. Broiler house with total capacity of 600 broilers, equipped with water and electrical facilities for the broiler	2 units
11. Brooder house with total capacity of 300 chicks	1 unit
12. Feed room	1 unit
13. Broilers	1,000 heads

2. SWINE (BREEDING) PRODUCTION

		Quantity
1.	Sows	10 heads
2.	Boar	1 head
3.	Weighing scale, 50 kilos cap.	1 unit
4.	Artificial insemination kit ($wine)	1 set
5.	Veterinary kit (include syringe, needles, etc.)	1 set
6.	Ear notcher	1 pc.
7.	Pig castrating kit	1 set
8.	Teat slitter	1 pc.
9.	Udder infusion cannullae	1 pc.
10.	Water rubberhose, 100 ft.	1 pc.
11.	Electric brooder (improvised)	1 pc.
12.	Shovel	1 pc.
13.	Wheel barrow	1 pc.
14.	Pick mattock	1 pc.
15.	Plastic pail, 5 gal. capacity	2 pcs.
16.	Pig tooth clipper	2 units
17.	Livestock scale, 500 kg. cap.	1 unit
18.	Thermometer	1 pc.
19.	Dummy sow (locally made)	1 pc.
20.	Piggery house with ten pens, equipped with water, electrical facilities and feed storage room	1 unit

3. RUMINANTS PRODUCTION

		Quantity
1.	Measuring tape	1 unit
2.	Cattle Halters	15 units
3.	Rope (manila/Nylon)	60 meters
4.	Refrigerator/Freezer	1 unit
5.	Scale, livestock heavy duty 500 kls.	1 unit
6.	Native plow with attachments	1 set
7.	Syringe, heavy duty	2 units
8.	Castrating kit	1 set
9.	Veterinary anatomy kit to include syringe, needles, etc.	1 set
10.	Syringe needles (stainless), assorted	2 sets
11.	Artificial Insemination Set (Cattle)	1 set
12.	Cows	15
13.	Bulls	2
14.	Goat (including 2 pure breed bucks)	15
15.	Carabao (includes carabulls)	5
16.	Livestock Structures	
	Cattle shed to include "tie-up" accommodation for 20 cattle, 3 isolation boxes, feed store, general equipment store, race for weighing and handling, milk handling and cooling room	1 unit
	Building to house, farrowing unit, dry and pregnant sow, boars and more or less 120 growing-finishing pigs	1 unit