TEACHING AGRICULTURE PRACTICALLY WITH PRODUCTION UNITS

version for National Teacher's Colleges

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Colophon
The Teaching Agriculture Practically (TAP) programme started in 2019 and is funded by the Belgium government. It focuses on the professional development of teachers and instructors in agricultural education and agri-entrepreneurship education. Partners are the Ministry of Education and Sports, National Teacher Colleges (NTCs) Mubende & Unyama, National Instructors College Abilonino (NTC) and VVOB - education for development. More information at *https://www.vvob.org/en/programmes/uganda-teaching-agriculture-practically.*

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Content

List of abbreviations

NTC National Instructors' College Abilonino

NTC National Teacher's College

TAP Teaching Agriculture Practically

CBET Competence Based Education and Training

BTVET Business, TechNTCI, Vocational Education and Training

PU Production Unit

Overview/ General introduction

This guide is about the production units, that are part of the farms at the teacher training colleges. The production units are spaces that enable and encourage practical learning, which is an essential part of the learning programme of the curriculum of future agricultural teachers. The teaching of agriculture practically is explained in detail to give a full insight of what it entails. This includes a systematic explanation of the principles of the Teaching Agriculture Practically (TAP) programme and how the programme changes the teaching and learning within the production units.

The guide also handles what production units are in terms of their characteristics; how they are managed and organised; their role in practical teaching and learning; their contribution to income generation; how financial planning for the production units is conducted; and who benefits from the profits generated from the production units.

In this guide, another important aspect considered is the relationship between the production units and the curricula pursued by the students undertaking the training on the production units. This includes students' introduction and preparation for the training and the courses undertaken.

The guide as well handles the assessment and evaluation processes of the students' work on the production units. It looks at what is involved in the systematic preparation for these processes to ensure that the students benefit maximumly from the training.

This guide belongs to lecturers, as it provides a complete overview on how teaching in agriculture could become more practical with production units. It is an enormous resource of ideas, examples, and knowledge about production units, and it uses a hands-on approach. Lecturers can use this guide in the preparation of the activities within their course units and related learning activities, leading to a more practical teaching approach, linked to the curriculum objectives.

This guide is also relevant to students, as it helps them to better understand what the college and lecturers aims for with production units and how the curriculum relates those objectives. But also: how active teaching and learning can be made real, based on the numerous examples, formats, schemes and other tools that are part of the guide. These examples and experiences are useful for when students become teachers as well.

Lastly, the guide is useful for the other stakeholders within the college, more in particular to the farm manager and farm attendants. It provides insight in the objectives and organisation of the learning and work at the production units, as well as hands-on approaches with explanation of their role in the learning and work processes.

Chapter 1:

Practical teaching and learning

1.1 Introduction: Teaching Agriculture Practically (TAP)

Practical teaching and learning refer to teaching and learning processes characterised by a strong focus on transfer of knowledge, building of skills and development of attitudes through practical exercises. Even though a theoretical basis remains an important precursor to practical teaching and learning, in practical teaching and learning both teachers and learners invest most of their time on the practical application of theoretical knowledge and concepts.

The need for practical teaching and learning of agriculture is underlined by the education sector, as well as some of the main policies that deal with that. A mismatch exists between skills required for the agriculture labour market and the skills developed at school, which requires attention (National Human Resource Development Planning Framework for Uganda, 2018). From the Uganda Vision 2040, it becomes clear that the education system needs to be changed to emphasise amongst others, practical skills. The National TVET policy (2019) states that all TVET institutions must emphasise practical and hands-on training which is integrated with flexible and work-oriented delivery methods.

The TAP-programme at VVOB was launched in 2019. Its objective is strengthening the professional development of teacher educators at the level of certificate for O-level secondary teachers to teach agriculture practically (TAP). The programme enables the graduates develop the competences – defined as the combination of knowledge, skills, and attitudes – for practical teaching / learning of agriculture. The TAP programme focuses on several principles that ensure its effective implementation and learning outcomes.

TAP is a process of instruction that facilitates acquisition of basic knowledge and practical skills by student teachers in the field of agriculture. TAP is made possible by engaging learners in practical lessons focusing on hands-on approaches, mainly outside the classroom on the land or in the farm, using video and other trajectories as demonstration methods of practical agricultural skills or participating in a value addition activity within a production space.

1.2 Principles of TAP

The principles of teaching agriculture practically are outlined as follows:

1. **Participation;** TAP is directed towards supporting student teachers / instructors, and lecturers work out their own problems rather than being given ready made solutions.
2. **Learning by doing/hands-on learning;** trainees learn better through their own experience rather than passive listening to lecturers and watching demonstrations.
3. **All stakeholder involvement;** this includes lecturers, instructors, farm managers, student instructors/teachers, college administration, governing council, and the community.
4. **Evaluation;** the effectiveness of TAP will be measured in terms of the changes brought about in the skills acquired and adoption of practical work.
5. **Stimulating creativity**, innovation and experimentation.
6. **Using locally available materials** and learning through collaboration and sharing.
7. **Use of technology** in a meaningful way and focus on technical skills.
8. **Making use of students'** plots/demonstration/projects sites.
9. **Relating to the world of work** in the agricultural sector when training.
10. **Exposure of students** to a variety of agricultural activities.
11. **Focus on entrepreneurship** and learning as one earns.

1.3 What the TAP programme means for the production units

The teaching within the new O-level curriculum takes a competence-based approach, just like it is already with the certificate level TechNTCl Vocational Education and Training (TVET) programmes. The TVET programme took on a purely competence-based education and training (CBET) approach with the launch of the Business TechNTCl Vocational Education and Training (BTVET) strategic plan, the new syllabi for TVET institutions and latterly the launch of the new TVET Policy. CBET requires the learners to advance in knowledge, skills and attitudes that they can apply in their day-to-day life situations. As a teacher of agriculture, you need to bring all academic concepts to life with visual or practical learning experiences in order to enable the learners relate what they are studying to their day-to-day life experiences.

Production units are part of the college farm. They offer an excellent opportunity for hands-on practice. There are a number of ways the TAP principles can be operationalised:

Ways how TAP principles can be operationalised

Creativity and innovation:

Production units will be used as centres for carrying out student's research, where learners are given tasks to prove their innovativeness and creativity. Example: making paper from banana pseudo stems.

Use of locally available materials:

Production units will be used to train students in improvisational skills through affordable teaching and learning. For instance soil sterilisation by using steam using pots.

Environmental sustainability and safety:

This allows sustainable use of production resources for themselves while conserving others for the future. Example: poultry litter recycled for production of maize and maize used for feeding poultry.

Hands-on, teamwork and sharing practice:

In the production units, students are given practical work during which they need to collaborate. This develops teamwork and the spirit of sharing, e.g., production unit tools, equipment and materials are shared across the production unit.

Chapter 2:

What are production units?

2.1 Introduction

Production units (PUs) are various model agricultural enterprises in a college farm set up for sustainable practical learning and profit generation. The PU's differ per college. Colleges have PU's for crops, such as a banana plantation, an agroforestry plot or a maize field. There are also production units for animal husbandry, such as a piggery unit, a unit for dairy cows, a goat farm or a fishpond. The farmland for PU's is situated within the college land.

These PU's are the different agricultural enterprises where lecturers integrate both theory and practical lessons which include topics such as pig breeding, cattle raising, apiculture, banana and maize growing, rabbit breeding, horticulture, poultry, goat rearing, etc. The major challenge for the PU's is to design strategies for using it as a practical learning station as well as for generating income for the college.

2.2 Characteristics of production units

Production units are centres for research and model units for community transformation. Production units play a dual role. While on the one hand teaching and learning take place in the production units, on the other hand the production units generate output and products for sale that generate revenue and profits that keep the production units running and self-sustaining.

Production units constitute agricultural enterprises that offer excellent opportunities for entrepreneurship education. The business model of production units – which includes amongst others the techNTCI production methods, the cost structure and the marketing strategy – therefore is an important parameter that requires full attention. Lastly, production units aim at improving the dietary variety of meals offered to students and college staff.

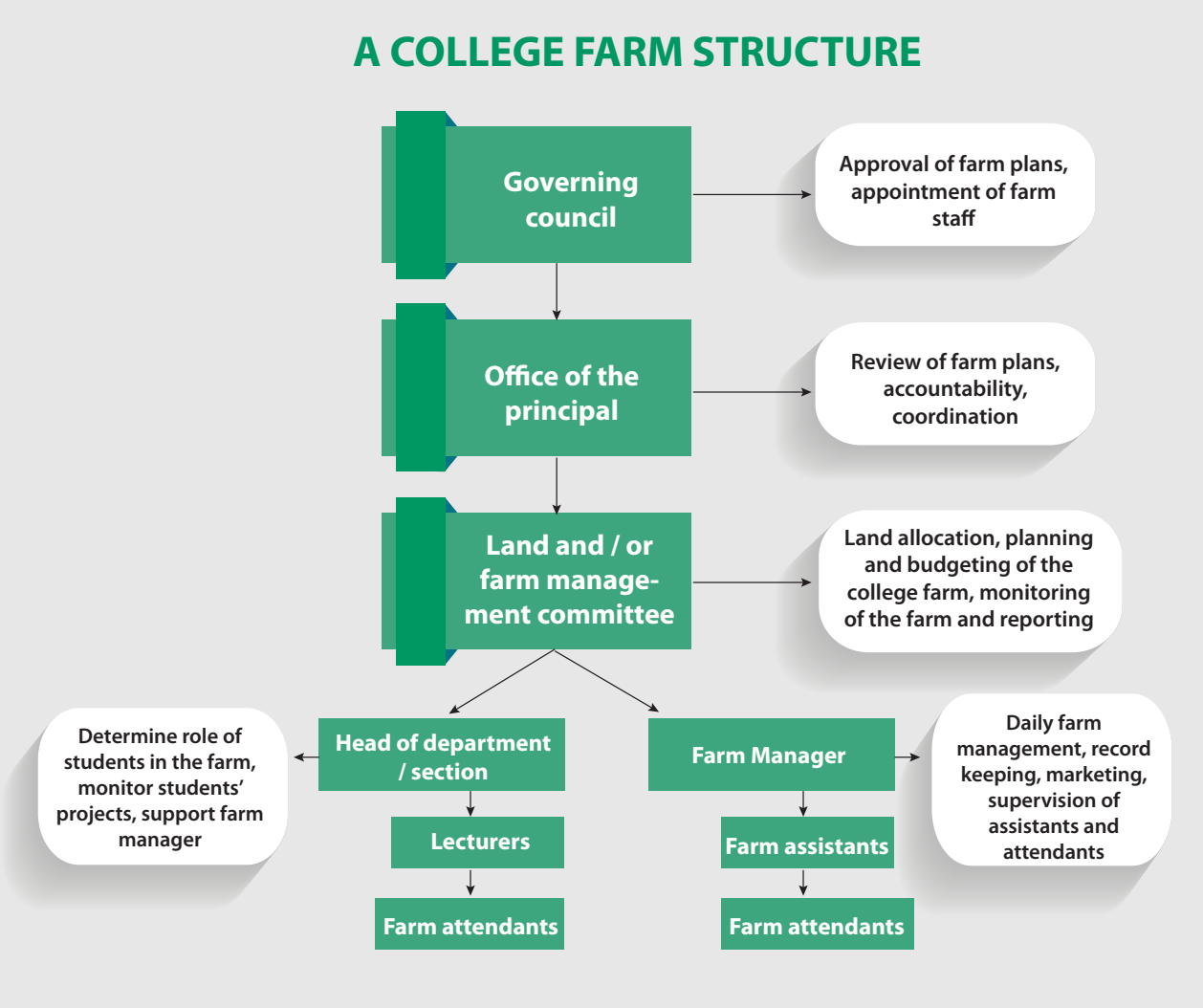
2.3 Management and organisation of production units

Institutions apply their own management principles and policy to manage production units. The management of production units is further influenced by the composition of the institution-specific teams that include academic (lecturers) and non-academic (farm attendants) staff as well as students. This means that the management and organisation of production units slightly differs according to the local dynamics present in the various teacher training institutions.

In general, the following stakeholders take part in the management and organisation of the production units:

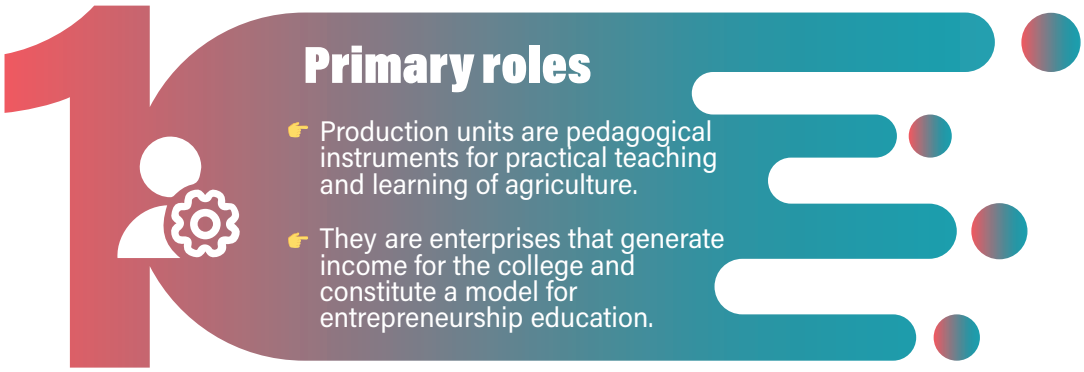
Stakeholder	Responsibilities
Governing Council	» Approval of plans and budgets. » Appointments of farm employees.
Office of the Principal	» Review of farm planning and budgeting. » Accountability and evaluation of farm activities. » Coordination and general management of programmes and projects within the college, including farm projects.
Land committee	» Land allocation to production units, students and college staff, including guidance for students, teaching and non-teaching staff on college land usage.
Farm Management committee	» Farm planning and budgeting, developing marketing strategy, coordinating sales of farm products. » Farm management and supervision of farm activities, including monitoring and reporting of the college farm activities to the principal's office.
Head of Department/ Section	» Monitor students' project research. » In consultation with other lecturers, determine the role of students within the production units (during practicals, etc.). » Support the farm manager in identifying potential customers and general market research. » Support the farm manager in the farm's records management, monitoring and coordination of production unit activities.
Farm Manager	» Overall responsibility to keep farm production and sales records up-to-date and complete (some of the responsibilities can be delegated to farm attendants if necessary). » Identify potential customers and organise sales of production units' products. » Overall responsibility of daily management of production unit activities. » Coordination and supervision of farm attendants' activities and casual labourers.

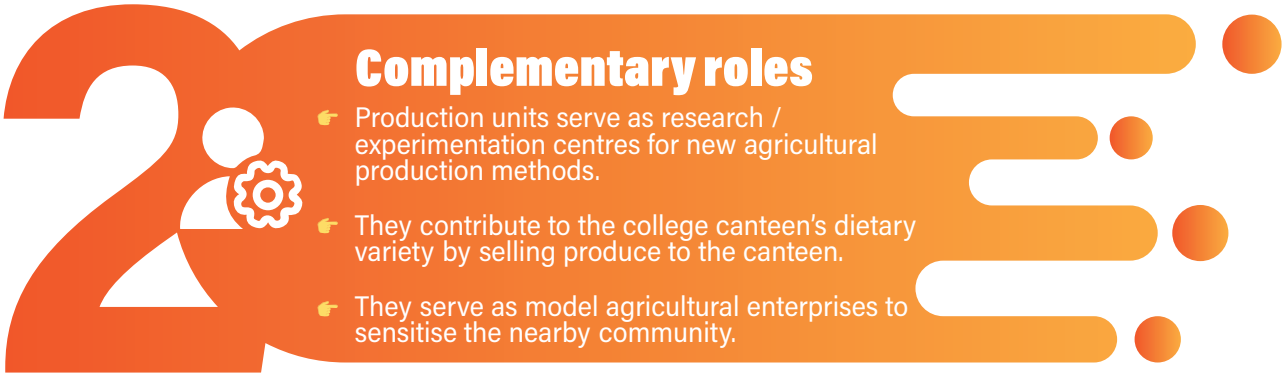
The following organigramme represents the overall structure of the college farm in a simplified form. In reality the farm structure may be more complex due to specific local factors and circumstances.



2.4 The role of production units

Production units serve both primary and complementary roles:





2.4.1 Income generation

Income generation in production units is a form of production undertaken as a business with the aim of making profit for the college.

A production unit organised as a business is characterised by a solid business plan. The most essential component of the business plan is the identification of a product or a service that meets a verified market demand. The business plan is rooted in a detailed techNTCl production plan that provides critical information on production costs and expected revenues. The plan includes the following elements:

INCOME GENERATION PLAN

01

The operating account:

The overview of fixed and variable costs is listed here, as well as the expected revenue for a given timeframe. Note that a detailed technical plan is required in order to determine the costs and estimated revenue.

02

The investment plan:

If a new production unit is being set up, it may require investments. These are listed in the investment plan.

03

The determination of the selling price per unit:

Based on the unit cost of production, the unit price of the product is determined by adding a certain margin, often 10 – 25%, depending on the product and the competition. An additional factor to consider are current prices on the market.

04

The break-even point:

The business plan includes the calculation of the number of units that need to be sold in order to reach the break-even point, where neither loss nor profit is made. The break-even point can be expressed either in number of units, or in terms of turnover (monetary value)

05

The return on investment and net profit margin:

The return on investment and net profit margin: These are calculated to assess the time it takes to win back the investments made and the profitability of the enterprise.

06

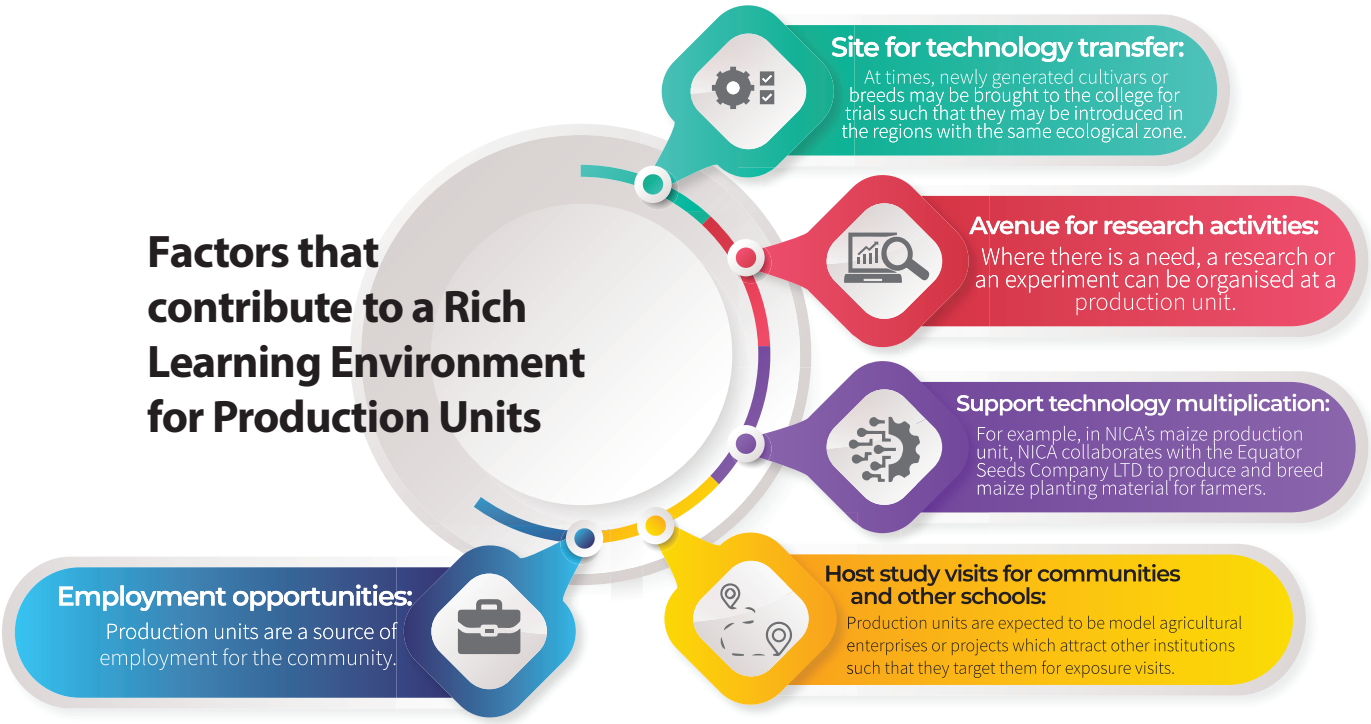
The liquidity plan or cash flow plan:

This plan stipulates, for every month, how much money is flowing into the business, through sales, for example, and how much money is flowing out in cluding purchases of agricultural inputs, payments of salaries, wages and utilities, etc. It is important that the balance remains positive, otherwise cash flow problems will occur.

2.4.2 Teaching and learning

Production units are used by the lecturers of the Agriculture Department and the student teachers for teaching and learning. In most colleges, production units have initially been set up for mainly pedagogical purposes. Sometimes they are referred to as pedagogical projects, with the prime purpose of teaching and learning.

However, since entrepreneurship education takes a central role in TAP, it is important that production units are organised as a business and are profitable. Indeed, a production unit that is not profitable is likely to have serious sustainability challenges and would most likely not be a suitable model for entrepreneurship education. Several factors contribute to a rich learning environment for production units:



2.5 Financial planning for production units

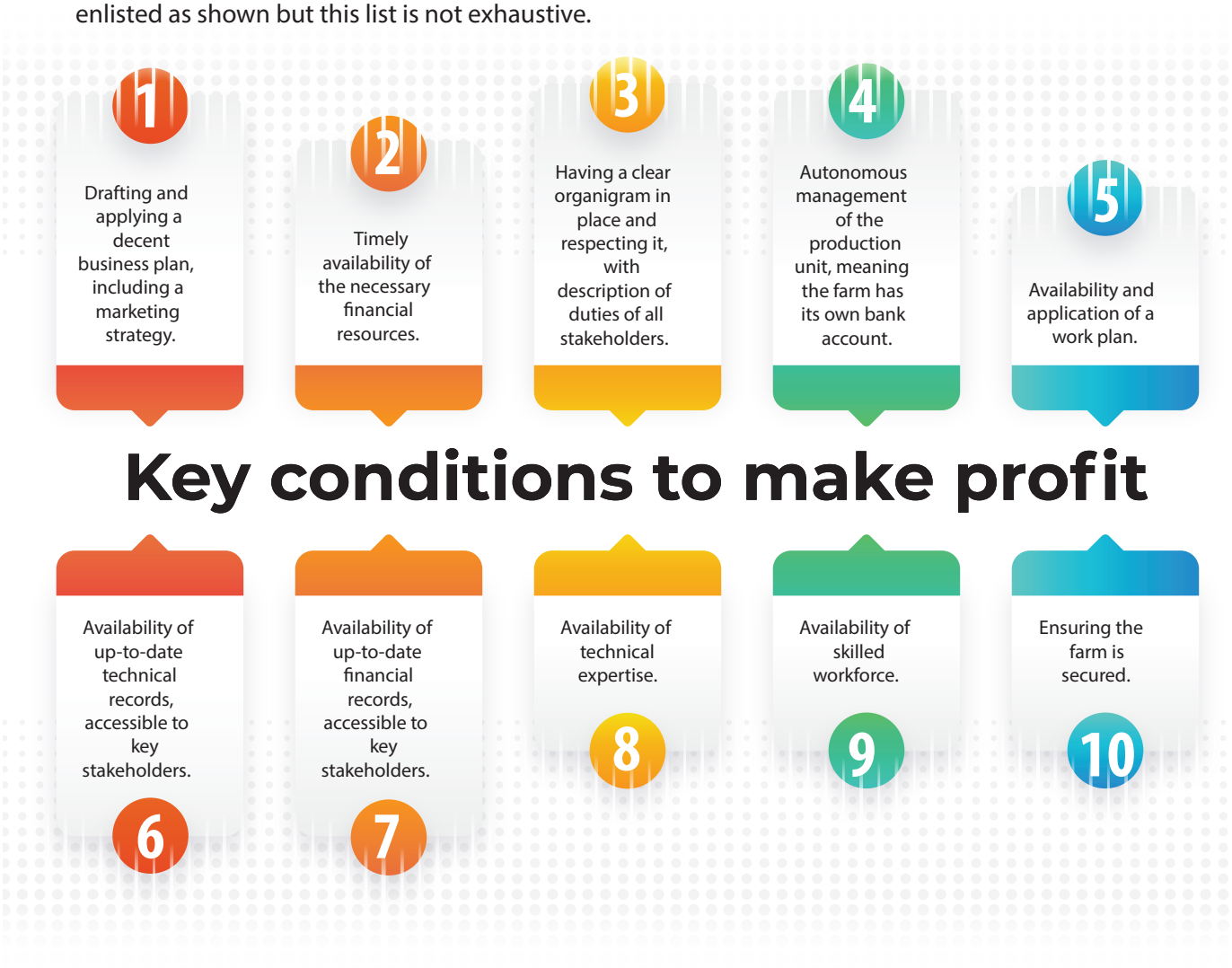
Lecturers, farm assistants, the farm manager and the head of department, united in the Farm Committee, draw up a budget to run the production units. The budget is forwarded by the head of department to the college administration through the college accountant, who sends it to the Principal. The Principal then takes the budget to the governing council for approval as part of the college budget. After approval, the principal releases funds to the Department of Agriculture for expenditure.

As the drawing of the budget follows the chronological sequence of the financial year (July to June), the following schedule of milestones is put forward.

Deadline	Milestone
31st of January	The farm manager consults with lecturers and drafts the budget for the production units.
28th of February	The Farm Committee reviews and updates the budget for the production units. The budget is submitted to the office of the Principal.
31st of March	The office of the Principal reviews and validates the budget and submits it to the governing council.
30th of April	The governing council approves the budget.
31st of May	The farm account receives the budget for the production units.

2.6 Destination of profit generated by production units

If production units are managed well, they will generate profit. Key conditions to make profit are enlisted as shown but this list is not exhaustive.



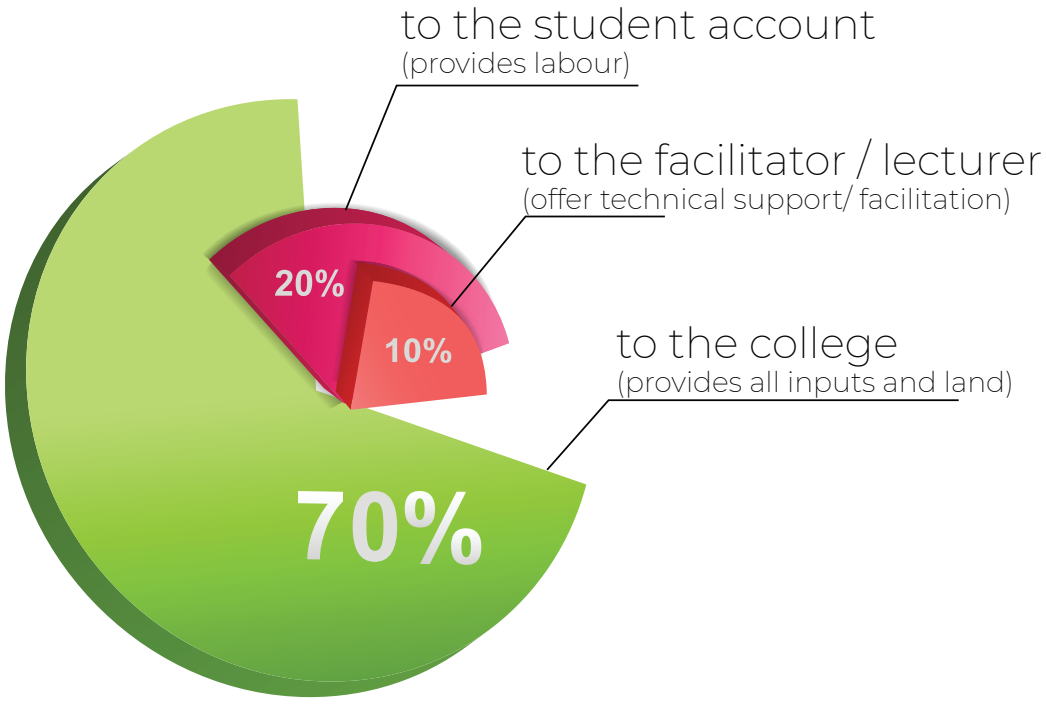
The farm and its respective production units generate income for the college by selling produce. The produce can be sold to the college canteen too (note that the canteen should pay for it to the farm; it should not be for free). Revenues from the production units are sent to the farm's bank account.

A portion of the revenue is ploughed back into the production units for maintenance, expansion and procurement of inputs and consumables. The business plan of the production unit specifies which amount needs to be ploughed back into the production unit. Another portion of the revenue is used for other developments such as feeding students, and staff, etc. However, it should be noted that before allocating a portion of the revenue generated by the production unit to whatsoever purpose, first the calculation of profit should be made.

Indeed, special attention should be paid to distinguish between revenue and profit:

Although differences exist between colleges, in general the teacher training colleges apply the "earn as you learn" principle for students of the Agriculture Department. In a college-specific reward system for student work in the college farm (production units and student plots), it is made clear if and how profits generated by production units and student plots are allocated to the students.

The profit generated by the production units is analysed, and the sum to be reinvested into the production unit is determined based on the needs stipulated by the business plan. The remaining sum is allocated to staff, students and the college, according to guidelines recommended by the land and farm development committee in consultation with college top management, as indicated in this example:



Chapter 3:

Production units and their relationship to the curricula

3.1 Introduction

Within TAP, and in line with the country's policies, hands-on learning is essential and contributes to better and more relevant learning outcomes. Student teachers will become better teachers when their own curriculum is practical. The practical use of the learning facilities within the colleges is essential for this. To facilitate practical teaching and learning, the production units play an important role.

Hands-on learning is essential to build practical skills and competences of future agriculture teachers. Therefore, teacher training colleges commit to develop and/or reinforce existing approaches for hands-on learning in production units and student plots through the rotation of students between production units.

The rotation system implies that colleges organise the learning within the units for first year students, allowing them to make rotations in crop production units, and for second years to rotate in animal production units.

Coaching and mentoring of students during hands-on learning is organised through a coaching and mentoring system by academic staff and/or support staff of the college farm, whereby lecturers prepare learning tasks, support and evaluate the students in each of the learning stations and the farm manager prepares the farm for a good learning environment.

3.2 Students' introduction and preparation

In the first year, students will start attending to the production units. The college management receives new students who are handed over to the office of the Dean of students in charge of student welfare. The office of the Dean of students organises an orientation programme for the entire group of new students (Year one). This orientation of new students takes about 4-5 days; the offices of the Principal, Registry, Dean of students, Warden, Heads of department and Head of sections are tasked with providing guidance during orientation. After the general guidance from the above team, students fall into their departments of humanities, science and vocational (Agriculture, Art /Design, and Business Studies) for instructions specific to the department.

In the Vocational Department, members then fall into their specific sections for guidance under the leadership of the Head of section (Agriculture). The section head of Agriculture then takes the new members through the requirements of the Agriculture course. He presents the roles of each member and organizes a tour of the agriculture laboratory, classroom, student learning area, and college production unit enterprises. Students are told what their roles will be in the students' plots, college production unit, what the contribution of each stakeholder in the agriculture section is and how the profits realised will be rationed among the stakeholders.

In production units, all students are expected to observe health and safety precaution measures by wearing the personal protective equipment - the safety precaution gadgets and production precaution gadgets. Safety precaution gadgets include waterproof overalls, waterproof hand gloves, eye masks, plastic nose and mouth masks while production precaution gadgets include gumboots, overall, gloves, and dust masks. The attendance time varies according to the severity and urgency of the activities that are performed in the production units. On average, 10 hours are expected to be used per week, during which students learn in a practical way by performing key activities.

3.3 NTC course units that use the production units

With the NTC curriculum, practical work is widespread in the production units. In the following table, the course units that make significant use of the several production units (8 – 12 hours in a course unit) are listed. A more detailed overview is shown in Annex 3.

Year 1 course units

Course Name	Code	PU link	Examples of activities
Cattle production	AG013	Cattle farm (dairy & beef)	Identify cattle breeds; feeding; milking; cleaning; taking records; putting identification marks; castration; dehorning; flaying; weight and age estimation; cleaning of shelters
Pig production	AG014	Piggery unit	Identification of breeds; feeding; controlling parasites; caring for pregnant sows; clipping; castration
Poultry production	AG015	Poultry unit	Identification of breeds; feeding; preparing a brooder; chick sexing; de-beaking; egg collection, cleaning, grading and packing; identification of laying hens; raking of litter; vaccination
Goat, Rabbit and Sheep production	AG016	Goat unit	Identification of breeds; selection of does and bucks; castration; dehorning; marking for identification; hoof trimming; slaughtering and processing of goat skins
Farm machinery and equipment	AG018	Maize unit	Use of farm tools; ploughing; planting; weeding; harvesting and storage; crop protection; milling and bagging

Course Name	Code	PU link	Examples of activities
Annual crops	AG0110	Maize unit	Cultivation; seed selection; planting; fertiliser application; weeding; scouting, identification of common pests and diseases; harvesting of maize; shelling, drying, milling
Principles of crop production	AG019	Maize and banana unit	Tillage; planting techniques and spacing; calibrating application of agricultural chemicals; plant management practices; preparing compost

Year 2 course units

Course Name	Code	PU unit	Examples of activities
Animal breeding	AG022	Goats	Selection for breeding; artificial insemination; interpretation of breeding records
Grassland pastures	AG0210	Goats	Identification of pasture grasses and legumes; planting pastures; pasture management; seed treatment; grazing management; conservation
Physiology and reproduction in farm animals	AG021	Goats and poultry	Dissection and identification of reproduction system; detection of heat signs; diagnosis of pregnancy in goats; identifying laying fowls
Animal production practical	AG0218	Goats and poultry	Brooding; feeding broilers; turning of litter; mixing of feeds; de-beaking; weighing; vaccinating; slaughtering and dressing; marketing. Identification of breeds; restraining; drenching; injection and taking blood samples; feeding; mixing of feeds; dehorning; castration; hoof trimming
Animal nutrition	AG023	Goats, poultry and piggery	Classification and identification of feedstuff; feed formulation; dissection and identification of digestive system of goats, pigs and domestic fowls; identification of mineral and vitamin deficiency symptoms; nutritional diseases
Animal health and hygiene	AG024	Goats, poultry and dairy	Observing signs of ill health; collecting blood samples for laboratory analysis; observation of animal parasites; drenching goats/cattle; spraying goats; dipping of livestock
Perennial crops	AG029	Banana	Field preparation; transplanting; weeding; de-suckering; pruning dry leaves; removing flowers; transplanting; propping; weeding; manuring; trenching; harvesting and marketing
Crop pests	AG027	Maize and banana	Identifying common pests; collecting and preserving crop pests; mixing/rating and safety handling of pesticides
Crop diseases	AG028	Maize and banana	Identifying common diseases; collecting and preserving plant specimen; photographing diseased plant parts; application of chemicals

Course Name	Code	PU unit	Examples of activities
Soil fertility and plant nutrition	AG0217	Maize and banana	Identification of fertilisers; application of fertiliers; evaluating plant response to different fertilisers
Farm management	AG0213	Maize, banana, goats, poultry	Preparing farm dairy, records and accounts; calculating gross margin analysis of enterprises
Farm structures and farm planning	AG025	Maize, banana, poultry, goats and piggery	Drawing the farm map with each enterprise and giving the justification for their location. Constructing maize crib Repairing goat, poultry and piggery structure /fence

Chapter 4:

Lesson planning and assessment

4.1 Introduction

The lesson planning and assessment process is important as this will operationalise the objectives and competences of the curriculum into lesson and activities that the students will learn. As part of the learning process, it is important that students are assessed to establish whether they have developed and grasped the knowledge, skills and attitudes necessary for practical teaching and learning of agriculture as provided for in the course units.

The learning and work in the production units can be organized in different ways. A lecturer can take the students as part of a lesson to the production unit(s) to demonstrate something, and have students also try that. Also, lecturers could explain a more conceptual topic in the classroom, and explain what hands-on activities and/or assignments need to be done in the production unit. Students will work on shorter or longer tasks. This could be individual as well as in groups. The lecturer needs to explain to the students how these assignments will be assessed, whereby practical learning activities ask for other types of assessment than a written test.

4.2 Lesson planning

The lesson plan is a teacher's guide prepared to facilitate the teaching and learning of a lesson content and how learning will be measured. It addresses why and how to teach, which activities to be handled and which materials to facilitate delivery of content. Lessons preparation that are based on teaching agriculture practically (TAP) entails the following steps:

- Identify the learning competences
- Plan for learning activities within the TAP lesson
- Prepare the lesson content in sequential manner
- Include a work sheet for students to guide them in the activity process
- Develop the assessment plan and instrument(s)
- Provide adequate time for the activity and lesson summary

An example of a lesson plan can be found in Annex 1. The example there is very similar to a lesson that could take place in the classroom. In this lesson, which is about the Establishment of banana crops, the lecturer introduces the topic, the objectives and shows a video about the topic. After the introduction, students are taken to the production unit, where the lecturer demonstrates how to prepare banana suckers to use for planting after which students in groups estimate and establish the correct banana plant population and fertiliser to use in a given area.

4.3 Use of worksheets

For practical tasks that students need to do as part of the learning process within a course-unit, a work sheet is an essential instrument to guide the activity. The key components of a typical worksheet include:

The lecturer needs to prepare worksheets for each of their lessons in order to guide the students carefully on the tasks to be done and the outcomes expected. An example of the worksheet is given below.

KEY COMPONENTS OF A TYPICAL WORKSHEET

- ✓ The task
- ✓ Competencies
- ✓ Working drawing
- ✓ Procedure (i.e. work in groups or individually)
- ✓ Materials
- ✓ Tools
- ✓ Occupational Health and safety precautions

Task /practical: Application of DAP fertiliser during planting maize seeds	Time: 6hours

Competences (learner will be able to):

- State the benefits of planting maize with fertiliser
- Identify the different types of fertilizers recommended for maize production
- Apply DAP fertiliser correctly during the time of planting maize

Procedure:

1. Apply fertilizer in weed free field
2. Consider the spacing of maize (90 × 30cm 1 plant/hill or 90 x60cm 2plants/hill)
3. Dig the holes at the planting depth of at least 2 to 3cm, it depends on the moisture content of the soil. For dry planting use planting depth at least 10cm
4. After digging holes you now apply the fertilizer (starter fertiliser DAP)
5. Drop the fertilizer in the holes. Determine the rate using a coke bottle top cover.
6. Cover the fertilizer completely with soil using the foot to avoid fertiliser not to come into contact with the seed/s
7. After the fertilizer put the seed/s in to the hole and cover it completely with soil using foot
8. Never step on the holes with the foot when covering
9. Demobilize Tools, equipment and materials used, clean them and take them back into the store
10. Write a comprehensive report

- Tools, equipment and Materials: maize seeds, hoes, different fertilizers, tape measure, bottle top cover soda, chart, markers ,masking tape and garden
- Occupational Health and Safety Precautions: Put on protective gears and be free of obstacles

A worksheet can be an activity at the production unit that a group or individual will do in limited time, for example during a lesson. The example given above shows that.

Especially at the production unit, lecturers can include activities that will take much longer and will take several days, or a number of weeks in which the student(s) return working at a certain task at the production unit. In Annex 2, an example of such an extended worksheet for working at the PU about Record keeping in a broiler unit from NTC Unyama is given. The sheets guides the students, and besides the daily and routine tasks it includes also a format for a broiler unit record in which students need to record daily the kilos of feeds, the average day growth and mortality among other things.

4.4 Assessment of the learning

Assessment is the process by which an individual or group's performance is judged through observation, monitoring and documenting the desirable change in behaviour of the learners. It can be defined as the process of designing, collecting and interpreting information about skills, knowledge and values of a learner(s). It can be done by the lecturer, the students themselves or peers.

Assessment is done by the lecturer as part of the lesson activity and must be planned before. This could be done by using a portfolio, a rubric instrument or another type of guide. A portfolio is a purposeful collection of student work that tells the story of the student's knowledge, skills and attitudes in a given area or areas in the PU based learning curriculum. A performance guide is prepared by a lecturer to aid students in execution of tasks. It helps them on how to carry out tasks and expected standards.

The use of rubrics for practical learning tasks is very useful. The holistic rubric tool for assessment is an assessment rubric that scores the overall process without judging component parts separately. A single score/grade is given based on a student's performance with no mark's for individual parts or stages. Another rubric format is the analytical rubric. It scores component parts separately following specific details marked to indicate strength and weaknesses. Marks are assigned to each component which then produce a total score.

This particular example uses 5 levels. The first criteria and its levels are given here:

Criteria/ steps	5	4	3	2	1
Nail clipping	Checked the limbs for long nails/claws, used a clipper to cut the nails leaving them 0.5cm long	Checked the limbs for long nails/claws, used a clipper to cut the nails leaving them more/less than 0.5cm long	Checked the limbs for long nails/claws, used a clipper to cut the nails completely off	Checked the limbs for long nails/claws but did not use a clipper to cut the nails	Never Checked the limbs for long nails/claws and did not use a clipper to cut the nails

The desired way of working is given on the left, and gives 5 points. When students have a rubric form before starting the activity, it will be very clear to them what is to be expected, as the assessment already is made clear beforehand. In this particular example there are 5 levels, but rubrics also could be in 4 or 3 levels.

4.5 Evaluation

Evaluation is the means of analysing information about a student's encounter with a learning experience by focusing on grades by making judgement of quality. For example, how good the performance is of something is- often using terms like excellent, very good, satisfactory, etc. In evaluation, the lecturer wishes to know which learning outcomes have been achieved or not and the degree or level of learners' performance. It involves use of assessment techniques such as; Classroom Assessment Techniques (CATs), Assessment rubrics, Student Progress Portraits, graphic organizer, Students Portfolios, etc.

Within the evaluation of a course unit, the practical work of students within the production unit will be included. The ways assessment were part of the course unit will enable the lecturer to use that in the evaluation of the students. The outcomes of the assessment will define the judgement that the lecturer needs to make after each course unit.

Annex 1. Example of a lesson plan of a practical lesson at the production unit

Names		Year / Class	
College		Duration	
Date		No of Students	F: M: PWDs:
Subject		Unit	

Topic	Perennial crops.
Sub-Topic	Banana.
Content	Establishment of banana crops.
Competences	Learner: - Describe field establishment agronomic practices of growing bananas. - Prepare a good sucker for planting - Estimate the plant population of banana in a given area - Dig holes for planting bananas & plant. - Appreciate good banana establishment practices.
Methodology	PBL Group work, Brainstorming, Demonstration and presentation
Instructional materials	Suckers, manures, hoes, wheel barrow, water, tape measure
Location	Banana plantation production unit.
Reference	Bienempaka etal (1990), Principles and practices of Agriculture vol 1, Macmillian Publishers Ltd. Richard.H. Mayer & Jeanne E .Bishop (1986), Merrill General Science, Charles, E Merrill Publishing Company. Vines .E & Rees .N.(2008), Plant and Animal Biology Vol.1 3rd Edition, Sir Isaac Pitman and Sons Ltd.

TIME	SESSION	TEACHERS ACTIVITIES	LEARNERS ACTIVITIES
10 minutes	INTRODUCTION	- Set the class environment - ask learners to watch video and identify banana establishment practices	- Settle in class - watch the video and Identify banana establishment practices & present.
60 minutes	DEVELOPMENT	Teacher asks learners to brainstorm & give characteristics of good suckers to use for planting. Teacher demonstrates how to prepare banana suckers to use for planting Teacher leads learners to calculate to establish the correct banana plant Population and correct fertilizer quantity to use in given area.	Learners brainstorm & present the characteristics of a good sucker to use for planting. Learners observe the teacher and participate in the demonstration. In groups learners estimate and establish the correct banana plant population and fertiliser to use in a given area.
25minutes	EVALUATION	Teacher asks learners to get tools, equipment& materials and dig holes for planting bananas & plant a sucker. Teacher also supervises	Learners get tools, equipment, and materials and make holes & plant a sucker.
25minutes	CONCLUSION	Teacher asks learners to carry out peer assessment of holes dug following the procedure given.	Learners move around and assess peers

SELF EVALUATION

Strengths	
Areas of improvement	
Way forward	

Annex 2. Example of an extended worksheet for working at the PU

ENTERPRISE: Broiler production unit

TOPIC: Record keeping in a broiler unit

Work sheet No: 2

Class/level: DES II 2021

Student name/Reg: …… **Activity date from ……... to ……**

Overview statement:

The performance of broiler type of chicken is dependent on several management practices. Brooding is one of the important aspects of broiler rearing and management. Proper management of broilers chicks at the early developmental stage is very critical for the overall result and growth of the bird, hence great care should be taken from day1.

Pre-activities:

Learners are required to form three groups of 10 members each. Each group will be required to feed, clean and take care of the birds for the relevant period in the poultry unit assigned to them. Learners are required to follow the daily routine for feeding strictly because that may influence your results. Remember you are responsible for the management of chickens within the specified period of time indicated on the task card. All feed needed should be weighed and recorded. All other tasks required in the section must also be performed.

Daily and routine tasks:

1. Inspect the broiler house every day at the times allocated including weekends and every evening.
2. Place as much feed as required necessary in the trough, to ensure availability of enough feed, but without wastage due to spillage. Record the amount of food eaten by taking the weight of newly opened full bag of feeds then divide by numbers of days used to fill feed troughs to get the amount of food used/day.
3. Record all data gathered on the given record sheet provided.
4. Rake the litter and remove wet bedding in the broiler house daily.
5. Remove and clean the water trough as soon as it becomes soiled.
6. Provide clean water in the water trough.
7. Weigh the birds every 7th day and record data on your record sheet. Plot the data on a graph, calculate the weekly weight gain, e.g. mass gain/feed period (days) = grams/week and feed conversion rate, e.g. feed given/mass gained = kg of feed used: kg meat gained.
8. Report any problems or sickness to the teacher in charge and indicate it on the record card.

BROILER UNIT RECORD

Description of activity……...

Batch /house number……Number of birds.....Feed cost/kg .....Ave. mass at beginning.....

Date	Day	Mass of 20 chicks	Mass change	Av. mass	Kg. of feeds	Average day growth. (A.D.G)	Feed conversion ratio (F.C.R)	Sickness	Mortality	Remarks
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									
	9									
	10									
	11									
	12									
	13									
	14									
	15									
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	17									
	18									
	19									
	20									
	21									
	22									
	23									
	24									
	25									
	26									
	27									
	28									

Farm manager comments

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Name (farm manager) Date ……. 2021 Signature……..

Lecturer comments

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Name (lecturer) Date ……. 2021 Signature……..

Annex 3: Full list of NTC courses

YEAR ONE

Animal Production		Crop Production	
Course Code	Course Name	Course Code	Course Name
AG012	Introduction to Livestock Mgt	AG019	Principles of Crop Production
AG013	Cattle Production	AG110	Annual Crops
AG014	Pig Production	AG0111	Horticulture
AG015	Poultry Production	AG0112	Weed Science
AG016	Goat, Rabbit and Sheep Production	AG0116	Introduction to Soil Science
		AG0117	Soil Physics
		AG0118	Soil Chemistry
		AG0119	Soil and Water Engineering
		AG0120	Crop Production Practical

YEAR ONE CROSS CUTTING COURSE UNITS.

Course Code	Course Name
AG011	Introduction to Agriculture in East Africa
AG017	Introduction to Agricultural Mechanisation
AG018	Farm Machinery and Equipment
AG0113	Introduction to Economics
AG0114	Production Economics
AG0116	Agricultural Education

YEAR TWO.

Animal Production		Crop Production	
Course Code	Course Name	Course Code	Course Name
AG021	Physiology and Reproduction in farm animals.	AG026	Crop Improvement
AG022	Animal Breeding	AG027	Crop Pests
AG023	Animal Nutrition	AG028	Crop Diseases
AG024	Animal Health and Hygiene	AG029	Perennial Crops
AG0210	Grassland Pastures	AG0211	Agroforestry
AG0216	Human Nutrition	AG0217	Soil Fertility and Plant Nutrition
AG0218	Animal Production Practicals		

YEAR TWO CROSS CUTTING COURSE UNITS.

Course Code	Course Name
AG025	Farm Structures and Farm Planning
AG0212	Agriculture Development
AG0213	Farm Management
AG0214	Agricultural Marketing, Cooperatives and Credit
AG0215	Agriculture Education II

Annex 4: TAP lesson plan template

Name(s) lecturer:	
College:	Date & hours:
Year / Class:	Subject:
No of Students:	Topic:
Duration:	Sub-topic:

Theoretical goals:	
Practical goals:	
Content:	
Location:	
Methods & Techniques:	
T/L Aids and materials:	
References:	

Time	Teachers Activity	Learners Activities

Self-Evaluation (to be filled by the lecturer after the lesson)

Strengths	
Areas of improvement	
Way forward	

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