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Experiential learning for agricultural students in institutions of higher learning: The case of Egerton University

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ABSTRACT

Traditionally, many universities have majored in training and research but are increasingly under pressure to proactively engage communities through their academic programmes. The need to produce graduates with practical experience in their areas of specialization is real and urgent. Universities must therefore seek innovative approaches to provide students with experiential learning through internship programmes, among other approaches. This paper documents Egerton University's farm attachment programme that provides agricultural students an opportunity to work with rural communities as part of their training. The paper outlines the approach used, characteristics of farms and farmers that participated in the programme, typology of students participating, lessons learnt and the impacts of the programme. Students were attached on farms for a minimum of eight weeks where they spent 3-4 days in the farm and 1-2 days at the Sub-County Agricultural offices. Since January 2014 when the programme was initiated, over 200 students and about 100 farmers have participated in the programme. Impacts and benefits of the programme include increased productivity at the farm level, increased awareness and utilization of agricultural technologies by farmers and students, lessons and experiences pointing to the need for curriculum review, as well as need for prompt, reliable and unbiased agricultural information, and ethnic integration. Integration of the farm attachment programme experiences into university-wide learning and teaching curricula and/or approaches will go a long way in safeguarding benefits realized and thus, increasing the relevance and contribution by Egerton University to development agenda. A model for scaling up the programme for greater impact is discussed.

Key words: Academic programmes, farm attachment, undergraduate students, universities

RÉSUMÉ

Traditionnellement, de nombreuses universités sont spécialisées dans la formation et la recherche, mais sont de plus en plus sous pression pour intégrer activement les communautés dans leurs programmes d'études. La nécessité de produire des diplômés avec une expérience pratique dans leur domaine de spécialisation est réelle et urgente. Les universités doivent donc chercher des approches novatrices pour offrir aux étudiants l'apprentissage pratique à travers des programmes de stage, entre autres approches. Cet article renseigne sur le programme de stage de l'Université d'Egerton ; qui offre aux étudiants en agriculture l'occasion de travailler avec les communautés rurales au cours de leur formation. Le document décrit l'approche utilisée, les caractéristiques des exploitations agricoles et celles des agriculteurs qui ont participé au programme, la typologie des étudiants participants, les leçons apprises et les impacts du programme. Les étudiants ont été placés sur les exploitations agricoles pour un minimum de huit semaines où ils ont passé 3 à 4 jours dans l'exploitation agricole et 1 à 2 jours dans les centres communaux de gestion agricole. Plus de 200 étudiants et environ 100 agriculteurs ont participé au programme, depuis son lancement en Janvier 2014. Les impacts et avantages du programme comprennent, l'augmentation de la productivité au niveau exploitation, une sensibilisation accrue et l'utilisation des technologies agricoles par les agriculteurs et les étudiants, les leçons et les expériences renvoient à la nécessité de révision des programmes, ainsi que le besoin d'information agricole rapide, fiable et impartiale, de même que l'intégration ethnique. L'intégration des expériences des programmes de stage dans tous les programmes et/ ou approches

d'apprentissage et d'enseignement concoure à la sauvegarde des bénéfices réalisés et ainsi, accroît la contribution et l'importance de l'Université d'Egerton pour l'agenda de développement. Un modèle d'extension du programme pour obtenir plus d'impact est discuté.

Mots clés: Programmes académiques, stage, Etudiants du premier cycle, les Universités

INTRODUCTION

Field/industrial attachment is a required course unit for over 60 % of undergraduate diploma and bachelor's degree programmes at Egerton University in Kenya. Attachment is tenable after three (3) and four (4) years of study for respective bachelor's programmes and, after two (2) years of study for Diploma programmes. The duration of attachment is a minimum of eight (8) weeks.

Field attachment is a session when students go out to real-life working stations to get exposed and to familiarize themselves, with the working environment in their areas of specialization. Over the years, attachment for students undertaking agricultural related training has focused on government parastatals and agri-based companies with little interaction with farmers, contrary to other countries like Zimbabwe (Edziwa *et al.*, 2012). Yet, attachment on farms provides students with an opportunity to learn and to utilize theoretical knowledge acquired in class, understand the opportunities and challenges that farmers deal with and propose mitigation approaches to some of the challenges. The goal of the farm attachment programme was to facilitate experiential learning to students by operationalizing linkages between Egerton University and farming community stakeholders so as to enhance agricultural productivity and competitiveness in Kenya. Specific objectives were to:

- (1) produce undergraduate students who will effectively contribute to the agricultural development agenda through experiential learning with farming communities,
- (2) create and strengthen linkages between Egerton University, farming communities and Service providers to improve service delivery to rural communities,
- (3) provide farm solutions that are empirical and socially acceptable to farmers,
- (4) develop an information and communication technology mechanism to enable farmers to access information from the University,
- (5) facilitate small-scale farmers to transition from subsistence to commercial farming, and
- (6) obtain feedback from farmers and other stakeholders leading to repackaging of University curricula, research and subsequent extension messages.

ATTACHMENT PROGRAMME DESIGN

In the case of Egerton University, the Farm attachment programme is designed such that students are attached to the same farm(s), continuously for at least 3 consecutive years. Each cohort of students builds on and follows-up on recommendations of the previous group. The first cohort of students focussed on making a general appraisal of the farm i.e. identifying the strengths and weaknesses of the farm and made proposals for improvement. The students and the farmers worked with backstopping by the project coordinators, lecturers and existing extension officers in synthesizing the report and proposing appropriate recommendations to the farmers. Concurrently, the student was nurtured as an analytical observer to be part of the solution that provides coordinated knowledge.

The second and third cohort of students were sent to the same farm (s) in the second and third and fourth cycle of Field Attachment respectively to oversee implementation of agreed on intervention measures (Figure 1). Preliminary evaluations of the programme have been done to assess students, lecturers, and farmers' perceptions of the farm attachment model. Every 8 weeks of learning cycle brought in new challenges and gathered innovations that can be incorporated in future research and/or packaged in future dissemination messages.

Farm and farmer characteristics

The Ministry of Agriculture officials based in Nakuru and Baringo Counties in Kenya recommended the farmers who participated in the first and second attachment cohorts. Thereafter, some farmers were recruited into the programme through direct interaction with university staff during student assessment, or at the recommendation of participating farmers. In this paper, household characteristics for the first cohort of farmers is presented. A total of 26 farmers were selected, however only 21 farmers responded to the baseline questionnaire. Sampling was done using non proportionate purposive technique. Students who were attached to the farms collected data through guided interviews.

Typology of students

Students who participated in the farm attachment programme were drawn from three faculties namely;

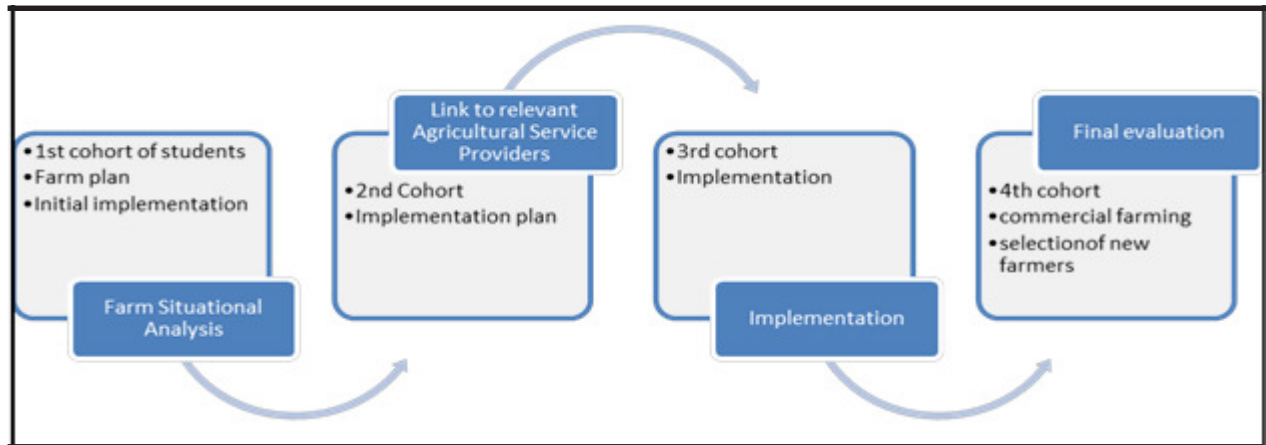


Figure 1: Egerton University Farm Attachment Model

Agriculture (114), Education and Community Studies (111) and Veterinary Medicine and Surgery (3) based on existing agricultural-related courses and willingness of students to participate in the programme.

Lessons learnt and impacts

Different tools have been developed to capture feedback from students, farmers and university assessors. Assessment reports by farmers and university lecturers provided more information. In addition, three stakeholders meetings and two post attachment feedback meetings were held.

Data analysis procedures

Data were analyzed using SPSS version 21. Descriptive statistics were done to work out the frequencies of the responses given by farmers. Measures of central tendency were used to give average measures of continuous quantitative data.

RESULTS

Programme approach

A key component of the farmer attachment programme is the continuous engagement with a farmer for a minimum of 2 years. A study evaluating the National Agricultural and Livestock Productivity Programme (phase II) in Kenya observed that the most effective duration to spend in a focal area is at least 2 to 3 years (Ngigi *et al.*, 2011). Sustained engagement with farmers is likely to result in increased farm productivity, which can translate to food security and improved incomes.

The farm attachment programme provided opportunities for regular consultation with farmers during student assessments and stakeholders meetings which created prospects for transfer of knowledge and information between the university and farming communities. However, there is need to restructure student assessments to ensure that learning is taking place for both the students and the farmers. Ngigi *et al.* (2011)

further observed that households receiving extension training achieved significant productivity improvement, and that farmers' improvement in knowledge and skill is not a sufficient condition for adoption. This calls for creation of a framework within the farm attachment programme that addresses some of the issues that hinder adoption. In addition, the cost of two assessments and hosting of stakeholders meetings has to be managed to ensure sustainable implementation of the attachment programme.

The farm attachment programme ensured the involvement of farmers as decision-makers in all stages in this rural innovation approach. Participatory research and learning approaches are strategies for investing in human and social capital for farming families to empower them to articulate their priorities and to participate as decision-makers in the research and development process (Pretty and Hine, 2001). Attaching students to farms decentralizes control over the research and development (R&D) agenda and permits a broader set of stakeholders to become involved in the learning processes, thereby addressing the differential needs for research and development for technical innovation (Ashby *et al.*, 2000). For example, initiatives such as the creation of farmer learning groups (FLGs) can mobilize rural communities to prioritize and articulate their demand for agricultural research, and to subsequently develop technology adapted to local conditions based on prioritized demands. These approaches can provide an avenue for feeding back farmers' demands and priorities to the university and research providers, thereby strengthening the capability for R&D systems to respond to the demands of rural communities. There is evidence that user participation in research and development can lead to more relevant technologies and greater economic impacts, especially when participation is early in the process (Johnson *et al.*, 2003).

Challenging aspects of the farm attachment programme included that of student accommodation and transport to and from Ministry of Agriculture (MOA) offices. The ideal situation is one where the student has a choice of where to stay, and has the resources to allow effective participation in the farm and at the MOA offices. This can be done through several approaches such as;

1. Government support through the Higher Education Loans Board (HELB) where each student receives a practicum allowance. This has been the case, but has been withdrawn for 2014 (and onward) admissions.
2. Payment of students while on attachment. A few medium/ large scale farmers paid students a daily allowance equivalent to what they paid the casual workers. However majority of farmers did not pay the students.
3. Students self-support – for those student who are able, they can support their upkeep while on farm attachment
4. Placement of students in areas where they can access alternative accommodation.

5. Resource mobilization by universities to support students on farm-attachment programme

For successful and sustainable implementation of the farm attachment programme, a blended strategy that employs all the above approaches should be utilized. Strategies for resource mobilization that includes partnerships with private sector involved in agricultural sector, cost sharing, proposals to development partners, and leveraging partnership with key alumni through the alumni association are needed. Egerton University launched a resource mobilization strategy for 2015-2018 which has several approaches for increasing funding to the university. Coordinators for the farm attachment programme will also lobby for increased support as the overall university funding is enhanced.

Farm and farmer characteristics

The following characteristics were documented for the first cohort of farmers; location, age, gender, main occupation, years of farming, land ownership and tenure, distance from social amenities, farm productivity for the two previous seasons, marketing of farm produce, farm plans, current constraints and sources of the farm development information. Table 1 provides a summary of some of the characteristics.

Table 1: Selected characteristics of farmers (and farms) who hosted students on attachment in the first farm attachment cycle

Characteristics	Location	N	%	Min	Max	Mean	Standard deviation
Location (N=26)	Nakuru	26	100				
	Baringo	0	0				
Gender (HH) (N=26)	Male	18.0	69.2				
	Female	8.0	30.8				
Age (N=21)	30-39	2.0	11.8	37	80	55.2	11.8
	40-49	3.0	17.6				
	50-59	5.0	29.4				
	60-69	6.0	35.3				
	70-79	0.0	0				
	>80	1.0	5.9				
Farming as main occupation (N=21)		15.0	71.4				
Yeas of farming (N=19)			26	3	66	22.1	17.4
Land ownership (N=21)	Freehold + title	15.0	71.4				
	Freehold - title	4.0	19				
	Rented	2.0	9.5				
Level of education (N=21)	None	1	4.8				
	Primary	2	9.5				
	Secondary	9	42.9				
	Post-secondary	6	28.6				
	University	3	14.3				

All the farmers who participated in hosting the first group of students were from Nakuru County (Table 1). The percentages of participating farmers has grown for both Nakuru and Baringo Counties as shown in Table 2. There were more (69.2%) male- than female-headed (30.8 %) households in the first cohort. This trend has been maintained through the six attachment cycles with an average of 68.9% and 31.1 % of male- and female-headed households, respectively (Table 2). However, the percentage of male-headed households for Baringo County was higher at 74.6%. Most of the farmers were aged between 60 and 69 (35.3 %), followed by 50-59 (29.4%) and 40-49 years (17.6%) with an average age of 55 years (Table 1). The youngest farmer in the programme was 37 years old while the oldest was 80 years.

The main occupation of majority (71.4%) of the farmers hosting students was farming although some had previous occupation and took up farming upon retirement. This is important to note, considering that retirement age in Kenya used to be 55 years (now 60 years since 2010) and this means that many people go to farming when they are advanced in age and may not be quick to try innovative approaches in the farm. Of the 23.8% who said that farming was not their main occupation, most were teachers and a few administrators (e.g. chiefs).

On average the farmers who participated in the programme had been in farming for 22 years. Majority of the farmers had secondary school education (42.9%). Of the farmers participating in the programme 14.3% of the farmers had acquired University education. A small percentage of the farmers (4.8%)

had no formal education. These percentages are in tandem with national demographics (KNBS, 2014).

Farmers were asked to state the number of parcels of land they owned and give the kind of ownership whether it was freehold with title, freehold without title or rented from other individuals. The results showed that farmers owned more than one parcel of land. When asked about the type of land tenure for their first piece of land (usually the main land parcel where the homestead is), 71.4 % reported that it was freehold land and they had title deeds for the land and 19.0 % said the land was freehold but without title deeds.

Previous studies have shown that farm(er) characteristics affect farming business productivity and profitability (Kidane *et al.*, 2006; Kinambuga *et al.*, 2012). The age of over 70 % of the farmers who hosted students on farm attachment was 50 years and above. The age and gender of the farmer are important power factors in rural communities, and have a bearing on farm productivity. Literacy, for example, enhances adoption of agriculture technologies through greater access to information.

Distance to social amenities

Distance to most social amenities was generally under 5 km, except distance to agricultural office(s) at 6.8 km, to output markets at 7.1 km and to internet access at 10.8 km. The distance to social amenities can influence farm productivity and profit margins, positively or negatively. It is important to note that when agricultural offices are located up to 24 km away from the farm, coupled with poor internet access, important information may not reach the farmer in a timely

Table 2: Gender aggregated number of farmers per farm attachment cycle

Cohorts	Baringo		Nakuru		Total
	Male	Female	Male	Female	
1	-	-	18	8	26
2	10	2	6	3	21
3	5	2	8	5	20
4	8	3	17	7	35
5	21	7	14	6	48
6	6	3	2	6	17
Total	50	17	65	35	167
% per County	74.6	24.4	65.0	35	
% overall	40.1		59.9		

manner. In general, most farmers were close to most social amenities with modes of < 1.0 km.

Farm plans

Most of the farmers had varying plans for the future but none had a written plan. The plans are summarized into four main areas;

- 1) Agricultural water management – some farmers (4 of 21) wanted to construct water reservoirs to improve farm water supply. Others planned on using drip irrigation.
- 2) Crop and livestock diversification – many farmers (19 of 21) wanted to introduce new crops like orchards, onions, forages, tree tomatoes, and strawberry. Most of the farmers understood the need to grow non-traditional crops to improve farm incomes. For livestock, some of the farmers wanted to introduce production of rabbits, fish farming, bee keeping, expansion of poultry and dairy units, and use of improved breeds.
- 3) Increase farm productivity – many of the farmers (20 of 21) wanted to increase farm productivity mostly by either increasing the acreage, herd size or number of animals, or growing commercial crops like wheat, tea and coffee.
- 4) Innovative approaches – some of the farmers (3 of 21) planned to apply innovative approaches including crop rotation, use of recommended fertilizer amounts based on soil testing results, and machine milking.

Farmers' constraints

Farmers listed the following constraints:

1. Financial constraints – lack of finances to implement planned activities or recommendations from students
2. Biophysical constraints – such as low soil fertility, and unpredictable weather conditions
3. Disease and pest control – emergence of new diseases such as maize lethal necrosis disease, and difficulties in treating known and existing diseases.
4. Lack of information on good farming practices – extension services were limited
5. High labour costs – labour has become less available and expensive
6. Lack of output markets – farmers sell to traders who set the prices for their produce without consideration of the production costs. Access to

markets is also a challenge for farmers who are not able to sell directly to markets in larger towns and cities due to organization structures of such markets.

Typology of students

A total of 228 students (150 males and 78 females) in 6 cohorts were attached to selected smallholder farms mostly in the study areas of Baringo and Nakuru Counties (Figure 2). Students were drawn from the Faculty of Agriculture (114), Education and Community Studies (111) and Veterinary Medicine (3). The number of female students participating in the farm attachment programme has progressively grown from first to the fifth cohort. Students in sixth cohort were drawn from one academic programme only, while students were drawn from four programmes for cohort 1 to 4, and from 9 programmes for cohort 5, explaining the trends observed in the student numbers shown in Figure 2. Table 3 shows the distribution of the academic programmes from which the students were drawn from.

Lessons learnt

Rural communities are keen to engage with the university, particularly in the area of sharing unbiased agricultural knowledge. While there are numerous sources of information for farmers, some of this information is inclined towards influencing a farmer to either purchase a product or a service. A public university that actively engages the rural community can contribute to closing of this information gap. The students appreciated the fact that farmers have experiences that enrich their understanding and application of agricultural principles learnt at the university. However, community engagement through student attachment requires more time and resources than the usual attachment model, but the benefits can be immense.

Impacts of the farm attachment programme

Increased productivity at farm level

There are already indications of increased farm productivity related to students' participation in the farm attachment programme. One example, increased milk production from 100 to 170 kg day⁻¹ in a farm in Eldoret, Kenya (Kirui and Mahuga, 2015). The increase was achieved through students' intervention in a) Formulating a new feed ration that included protein supplementation of feeds that were being fed to the animals; b) Timing of feeding to the animals to allow time for synthesis of milk; c) Timing on when to milk, where they established a firm routine for milking. Previously the animals were milked at different times; and d) Improving the hygiene of the milking parlour and feeding area.

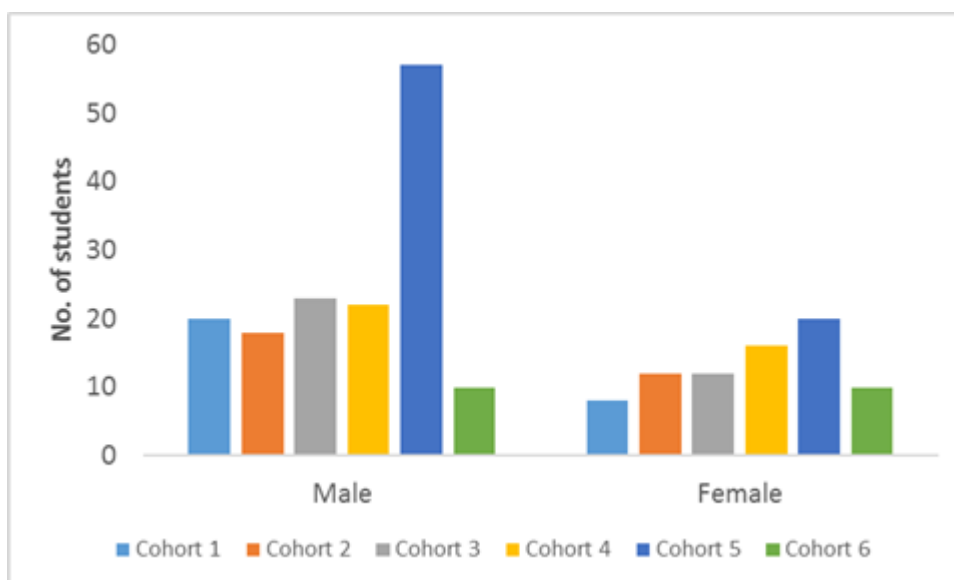


Figure 2: Number of students attached to farms in six attachment cycles from January 2014 to December 2015

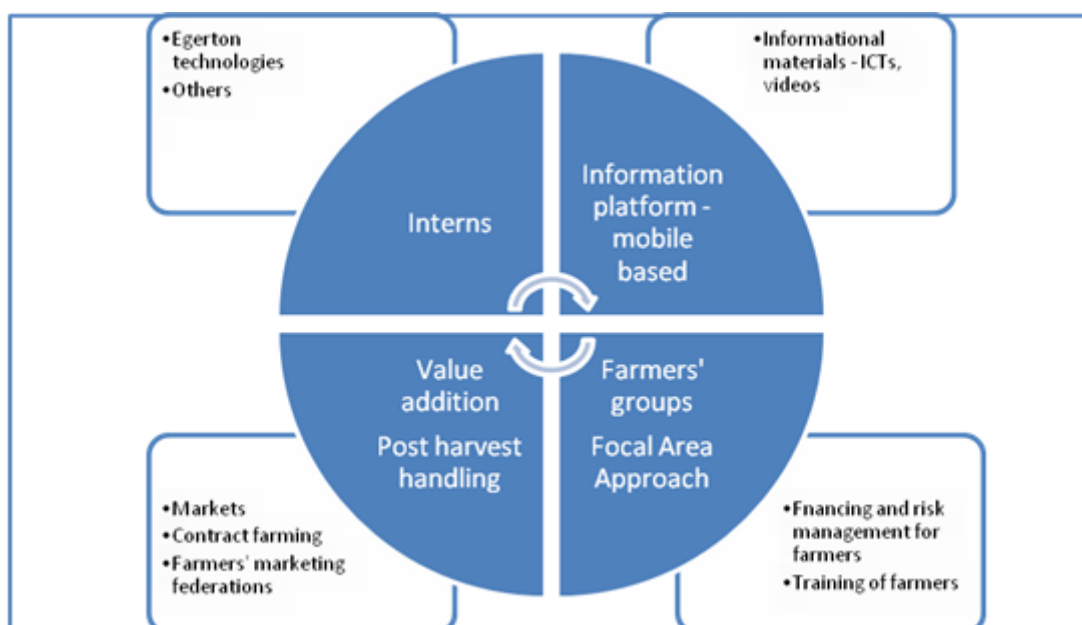


Figure 3: Proposed Model for Upscaling Farm Attachment Program at Egerton University

Increased awareness and utilization of agricultural technologies by farmers and students

Record keeping

Over 95% of the students attached to farms helped to organize farm operations and initiated record keeping (Nyambura, 2015). In this process students helped farmers to do farm planning and budgeting besides routine activities e.g. correct choice and use of herbicides, pesticides, postharvest storage, and marketing. The outcome is that the farmers began to view farming as a business and not for subsistence only.

Improved family nutrition and incomes

- a. Students assisted farmers to establish vegetable gardens, fruit orchards, institute soil conservation measures and encouraged use of fuel-saving stoves (Kigo, 2015) .
- b. Students also worked with the farmers to initiate small scale value addition to farm products e.g. ghee making, refining of honey, preservation of vegetables and fruits through sun-drying
- c. Students (particularly those in BSc. Community Development) encouraged women farmers to have

Table 3: Description of academic programmes from which students were drawn

Cohort	Academic programmes	Description
Cohort 1 and 2	Dip. Animal Health, Dip. Farm Resources Management, Horticulture, Dip. Agricultural Education and Extension	3-year Diploma level
Cohort 3 and 4	BSc Community Development, BSc Animal Science, BSc Horticulture, BSc Agriculture, BSc Agriculture and Human Ecology	4-year Bachelors level
Cohort 5	Dip. Animal Health, Dip. Farm Resources Management, Dip. Horticulture, Dip. Agricultural Education and Extension BSc Community Development, BSc Animal Science, BSc Horticulture, BSc Agriculture, BSc Agriculture and Human Ecology	3-year Diploma level and 4-year Bachelors level
Cohort 6	BSc Agricultural Education and Extension	4-year Bachelors level

their children immunized and registered as well as encouraged improved feeding on balanced diets and family budgeting

- d. A number of farms recorded increased farm family income as a result of the advice and contribution by the students

Need for curriculum review

Students taking BSc Community Development do not take any courses in agriculture, although they participate in agricultural practicals such as composting and multi-storey gardens. One student said “Limited knowledge on farm activities including farm inputs and outputs dwarfed my expertise in my relevant field”. Since over 60 % of the Kenyan population is rural-based, there is a need to include basic agricultural skills and knowledge in the BSc Community Development Programme.

Need for prompt, reliable and unbiased agricultural information

Students on farm attachment were confronted with questions from different agricultural enterprises underscoring the need for capacity enhancement in new approaches of extension service delivery. A call center will be useful as a backup for students on attachment. There is also need to enhance capacity building for communities. This is especially so, owing to the large number of new farmers interested in farm attachment programme.

Proposed upscaling of the Farm Attachment Programme

Upscaling the programme shall incorporate supply and value chain approaches, which includes system and enterprise integration; scaling-up indigenous knowledge; responding to emerging issues; capacity building of stakeholders; market orientation and enterprise development and gender-responsiveness. A focal area approach will be implemented: – two wards (smallest administrative unit) each in three counties – Nakuru, Baringo, and Nyandarua. At least 25 farmers’ groups will be involved within a ward which is approximately 750 farmers per ward. A minimum of three students from different degree programmes which complements each other will be attached to a farming group. This implementation strategy will facilitate transistioning of smallholder subsitence agriculture to commercial farming and hence build competitivenss among these farmers (Figure 3).

CONCLUSIONS

Students attached to farms were able to learn directly from farmers, introduce new agricultural methods to the farms and most of them appreciated farm attachment as a holistic training approach. Linkages between Egerton University and farming communities have been

strengthened through the programme. However, the link with other service providers needs to be improved. The demand for farm solutions that are empirical and socially acceptable to farmers is apparent. Most farmers are willing to implement new technologies but are constrained by lack of financial resources and emerging biophysical challenges like diseases, pests and climate change. Most of the farmers (85 %) had at least a secondary school level education and above. Further, the average age for farmers was 55 years with over 70 % of the farmers older than 50 years. Institutions in the agricultural sector should foster information and communication technology mechanisms to enable farmers to access relevant agricultural information and technologies that are relevant and suited to the farmer who is older and generally literate. Finally, there is need to develop methods that measure and examine the outcomes, impacts, and nature of university-community engagement to allow transferability to other institutions of higher learning.

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STATEMENT OF NO CONFLICT OF INTEREST

We the authors of this paper hereby declare that there are no competing interests in this publication.

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