Teaching animal products: From meat science to tropical animal products industry in Nigeria

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Abstract

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At the introduction of courses in animal products (AP) in Nigeria, meat science was the main focus of the training. In response to graduate unemployment and the paradigm shift to entrepreneurship, self-employment and job creation for university graduates, the AP curriculum was expanded to include topics in economics and marketing and to emphasize the business dimension. For the curriculum review to be successful, there was the need to generate greater passion on the part of the teacher to teach and on the part of the student to learn all the technical, as well as the business aspects of courses in AP. The hypothesis tested in this study was that: "making AP instructional material available online in an Open Access format with lots of illustrations and downloadable onto the smart phone will lead to improved students' performance". The content of Module 1 of "Tropical Animal Products Industry in Nigeria", an Open Access e-book which was developed in line with instructional design methodology, was made available to the AP class in one year via the usual face-to-face teaching mode. In the following year, the content was made available via Google drive. Class performance in the two years was recorded and charted. Without the Google drive, 54% of the class scored less than 50% and only 2% of the class scored 70% of the marks obtainable. With the Google drive, 0% of the class scored less than 50% while 23% scored 70% and above of the marks obtainable. The Open Access e-material developed in compliance with instructional design directives evoked a higher student performance. The significance of Open Access instructional materials on AP in the development of the AP industry in Nigeria is the focus of the study.

Keywords: Teaching, Animal Products, Courses, e-book, Open-access

Enseigner les produits animaux : de la science de la viande à l'industrie des produits animaux tropicaux au Nigéria

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Résumé

Lors de l'introduction des cours sur les produits animaux (PA) au Nigéria, la science de la viande était le principal objectif de la formation. En réponse au chômage des diplômés et au changement de paradigme vers l'entrepreneuriat, le travail indépendant et la création d'emplois pour les diplômés universitaires, le programme PA a été élargi pour inclure des sujets en économie et marketing et pour mettre l'accent sur la dimension commerciale. Pour que la révision du programme réussisse, il était nécessaire de susciter une plus grande passion de la part de l'enseignant pour enseigner et de la part de l'étudiant d'apprendre tous les aspects techniques et commerciaux des cours en PA. L'hypothèse testée dans cette étude était que : « rendre le matériel pédagogique PA disponible en ligne dans un format en libre accès avec de nombreuses illustrations et téléchargeable sur le téléphone intelligent conduira à une amélioration des performances des élèves ». Le contenu du module 1 de «

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L'industrie des produits animaux tropicaux au Nigéria », un livre électronique en libre accès qui a été développé conformément à la méthodologie de conception pédagogique, a été mis à la disposition de la classe PA en un an via l'enseignement habituel, face à face. L'année suivante, le contenu a été rendu disponible via Google Drive. Les performances de la classe au cours des deux années ont été enregistrées et cartographiées. Sans le lecteur Google, 54% de la classe a obtenu moins de 50% et seulement 2% de la classe a obtenu 70% des notes disponibles. Avec le lecteur Google, 0% de la classe a obtenu moins de 50% tandis que 23% ont obtenu 70% et plus des notes disponibles. Le matériel électronique en libre accès développé conformément aux directives de conception pédagogique a évoqué une meilleure performance des élèves. L'étude porte sur l'importance du matériel didactique en libre accès sur les PA dans le développement de l'industrie de l'PA au Nigeria.

Mots clés: Enseignement, Produits animaux, Cours, e-book, en libre accès

Introduction

The first set of lecturers in animal products (AP) in Nigeria were trained in meat science in the United States of America: Okubanjo (at the University of Ibadan, Ibadan), Igene (at the University of Maiduguri, Maiduguri and University of Benin, Benin City), Sonaiya (at Obafemi Awolowo University, Ile-Ife) and Aduku (at Ahmadu Bello University, Zaria). Typical textbooks used and recommended for AP courses were: Judkins and Keener (1961), *Milk Production and Processing*; Lawrie (1966), *Meat Science*; Zottola (1972), *Introduction to Meat Microbiology*; Kramlich *et al.* (1973), *Processed Meats*; Forrest *et al.* (1975), *Principles of Meat Science*; Mountney (1976), *Poultry Products Technology*; Price and Schweigert (1978), *The Science of Meat and Meat Products*; and Frazier and Westhoff (1978), *Food Microbiology*. By the middle to late 1980s, efforts were made to produce indigenous textbooks that would accommodate the peculiarities of handling animal products in Nigeria. Three of such texts were: Sonaiya (1984), *Animal Products*; Ikeme (1990), *Meat Science and Technology – A comprehensive Approach*; and Aduku and Olukosi (1991), *Animal Products - Processing and Handling in the Tropics*. These texts made it clear that the AP curriculum needed to be expanded to include topics in economics and marketing

of animal products. In the same period, Taylor and Kauffman (1983) reported that the challenges facing the teaching of animal science courses included increased need for computer integration, improved communication skills, integration of business and economics into the livestock management systems and the approaches that will motivate students to learn and think. In Nigeria, the value chain approach to AP has been shown to open up investment opportunities in the AP industry (Sonaiya, 1998). The hypothesis tested in the study reported in this paper is that making textbooks available online in an Open Access format with lots of illustrations and downloadable onto the smart phone will lead to improved student performance.

Materials and methods

The response to changing needs for course content and student orientation has to be accompanied by textbooks / instructional materials that are available online as electronic books in an Open Access format that makes access via the Internet as easy for the student as Facebook. To prepare adequate AP instructional materials requires the author to be familiar with curriculum and instructional design. In curriculum design, any course (for example

Animal Products, which is a segment of a B.Sc. / B. Agric. Animal Science programme must contain at least 3 modules. The content of each course can be visualized thus: Programme Courses Modules Study Units Sections Sub-Sections. A module is a number of logically and thematically related study units. A study unit is the smallest segment

of a course material that treats a topic which should adequately engage a learner for 3–4 hours of study. Each study unit can be viewed as an individual lecture and, depending on the topic, can be up to 25 pages (Times Roman, 12-point size, single spacing) or as brief as 7 pages. The content of a typical study unit (NOUN, 2012) is shown in Table 1.

Table 1. Content of a typical study unit
Study Unit Title

1.0	Introduction
2.0	Objectives
3.0	Main Content
	3.1
	3.2
	3.2.1
	3.2.2
	3.2.3
	3.3
	3.4
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References/Further Readings

The textbook author's role is to analyse the course description and break it into appropriate study units, write appropriate learning objectives for each unit, select relevant content to attain these objectives and design relevant questions / activities to assess learners' attainment of stated objectives. Course learning materials are to be self-instructional; i.e. to "replicate what the teacher does in the classroom". The materials must be interactive and must stimulate independent learning; should be self-explanatory, self-contained, self-directing, self-motivating and self-evaluating. **Self-assessment exercises (SAE)** use questions, exercises and

activities to enable learners review what they have learnt and assess/evaluate themselves. Tutor-marked assignments (TMA) are needed at the end of every study unit and at the end of every module. These are short answer or essay questions, projects or practical sections for students to carry out which can serve the purpose of continuous assessment (CA). Summative assessment (SA) is the end of semester examination. A typical illustration of this is the content of "Tropical Animal Products Industry in Nigeria" (Sonaiya *et al.*, 2019), an Open Access e-book which was developed in line with instructional design methodology, as shown in Table 2.

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Table 2. Content of “Tropical Animal Products Industry in Nigeria”

Module 1 Introduction to animal products, animal by-products and animal products industry	
Unit	Study Unit Title
1	Introduction to animal products and by-products
2	Introduction to the animal products industry
3	Products of captured, hunted and harvested free-living animals
4	Products of domesticated food animals
5	Products from other domesticated ruminants and herbivores
6	Products from insects and special animals
7	Animal fibres and inedible animal products
Module 2 Meat production and primary processing	
Unit	Study Unit Title
8	Animal growth and development
9	Animal body composition
10	Primary processing systems
11	Slaughter and conversion of muscle to meat
12	Meat processing, preservation and storage
Module 3 Secondary processing, product hygiene and safety	
Unit	Study Unit Title
13	Secondary processing of meat animal products
14	Processing of egg and milk
15	Animal products hygiene and inspection
Module 4 Technical and economic aspects of animal products industry	
Unit	Study Unit Title
16	Distribution and sale of animals and animal products
17	Economic and social value of animal products
18	Animal products science & technology

The material on Module 1 of TAPIN was made available to the class via Google drive (<https://drive.google.com/drive/folders/1pGYQxkA5Lt96jmOYaH85o8psZTNOs4m?usp=sharing>) and class performance without (in the 2017/2018 session) and with the drive (in the 2018/2019 session) was recorded and charted.

Results and discussion

The class performance without and with TAPIN Google drive is shown on Figures 1 and 2. With an enrolment of 43 students in Figure 1, 54% of the class scored less than

50% and only 2% scored 70% of the 50 marks obtainable. In Figure 2, enrolment was 51 and 0% of the class scored less than 50% while 23% scored 70% and above of the 72 marks obtainable.

Between 1975 and 2000, graduates in agriculture with 'specialization' in animal products tended to work in ministries, departments and agencies at local, state and federal governments. They tended to work as general agriculture officers rather than focus on animal products. Virtually none of these graduates were self or privately employed in meat and animal products sale, marketing and processing. By 2010, employment opportunities became increasingly scarce and the need for self-employment, for entrepreneurship and business ownership became self-evident. In response, teachers of animal product courses started to look at meat animal products as part of an industry which is valued in multibillions of Naira and with a distinct value chain starting from the farm gate to the local animal market, on to the regional markets in Kano, Ibadan and Port Harcourt, and from these locations to abattoirs, slaughter houses and cattle gardens, before meat animal products get to the final consumers on the family table. Applying the value chain approach to the other two animal products, milk and egg, equally opens up vistas for small, medium

and large scale investment opportunities in the animal products industry.

Another approach to facing the challenge of the lack of involvement of AP graduates in the AP industry is to promote (a) rigorous internship after graduation, or (b) proper demonstration of the business dimension in the AP industry during the AP courses taken within the university. However, the business dimension of AP has not been sufficiently emphasized in the curriculum. For example, Nigeria is the top egg producer in Africa and 19th in the world but our teaching syllabus does not reflect this fact in terms of grading systems for external and internal quality or storage and processing of eggs into liquids and powders. Also, the Federal Government during the Agricultural Transformation Agenda (2011-2015) made milk production and consumption a national priority and has been promoting the establishment of Milk Collection Centres (MCC) to offtake milk produced by the pastoralists. National daily demand for milk is 3,300,000 L while daily production is 1,100,000 L revealing a demand gap of 2,200,000 L which is made up by annual import of 77,757 MT dried milk powder, 20,537 MT dried evaporated milk, and 17,504 MT dried skimmed milk at a cost of \$398,870,054 (FMARD, 2012).

MCC and cottage milk processing have not yet entered the syllabus for animal products in 2019. With the paradigm shift towards entrepreneurship and business orientation came a need for curriculum review and for textbooks adapted to the new paradigm and properly focused on the AP industry rather than meat, egg or milk sciences. One way to generate more passion on the part of the teacher and student, to learn and understand all the TECHNICAL, as well as the BUSINESS contents of animal products and value addition is to make textbooks available online as electronic books (e-books) in an Open Source format that makes access to instructional materials via the Internet. Open Source can provide a panacea to the dearth of textbooks. Greater interest is generated in the students if such e-books are more attractive with lots of illustrations and can be downloaded onto the smart phone. The next generation of Nigerians needs animal product scientists that are well trained and knowledgeable about the science, business, economics and politics of animal products and can leverage their knowledge to create viable businesses. In order to promote entrepreneurship in the AP industry, animal product scientists must apply the value chain approach in teaching about meat, milk and egg. To achieve this, Open Access e-books explicating the nature and dynamics of the tropical animal products industry in Nigeria are needed.

Conclusion

There is a need for the development of Open Access e-books to promote the teaching and learning of animal products course contents in the tertiary educational institutions in Nigeria. The graduates of such an e-learning process will be better equipped to be entrepreneurs that will be able to create jobs within the animal products industry in Nigeria.

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Received: 20th August, 2020

Accepted: 20th November, 2020