Chapter 1: Guide I

1.1 Title of a Project/Journal Article

The title of any project or journal article tells the reader what the study is all about. The title may not necessarily be a complete sentence but could be a phrase that is concise, accurate and informative. The aim is to give the reader as much information as possible using few words. It should contain key words of the project or journal article, minimizing words and space for the benefit of information retrieval systems. A good title for a research report describes the contents of the project or journal article accurately, describes the subject as specifically as possible, avoids abbreviations, formulas and jargon, usually omits the verb and is only a label. It should be catchy, interesting and precise. A title should contain no more than 10 - 18 words for undergraduate work and journal article. But, it could contain more than 18 words for a Master's Degree and PhD work. The most important phrases should come first. It should appear on the cover/front page of the project work/journal article.

The title of a project or journal article will probably be the most read than any other part, both by researchers scanning through the contents of a project or journal article and by those depending on searches through secondary sources, which always carry the title and author's name. The title may be reprinted in bibliographies and subject indexes, stored in bibliographic databases and cited in other projects and journal articles. A good captivating title may help future researchers to find important information while a poor boring title hampers them from doing so.

1.2 Criteria for Choosing a Good Project/Journal Article-Title

Each title that is proposed for research has to be judged according to the following criteria.

1.2.1 Relevance

Normally, the title a researcher chooses should reflect a priority problem. This problem may be identified by the researcher and his research team working in an area, together with livestock or crop farmers from that community. Questions to be considered should include:

- What is the nature of the problem?

- What is the magnitude of the problem?
- And is the problem worth researching?
- Who are affected by this problem?
- How severe is the problem?

A researcher should think of serious agricultural problems that affect large number of farmers, or of the most serious problems that are faced by managers of agricultural systems in the locality where he/she resides or in the locality where he/she intends to conduct the research.

1.2.2 Avoidance of Duplication

Before a researcher decides to carry out a study or research, it is important that he/she finds out whether a previous research on the suggested title has been undertaken within the proposed study area or another area with similar conditions. He/she does that by literature review and going through other peoples work. If the title has been researched before, the results should be reviewed in order to explore whether major questions that deserve further investigation have remained unanswered. Otherwise another title should be chosen.

1.2.3 Feasibility

A researcher should look at the project he/she is proposing and consider the resources required to conduct the research. Thought should first be given to manpower, time, equipment and funds that are locally available at his/her disposal. In situations where the local resources necessary to carry out the project are not sufficient, he/she might consider seeking resources available at the national level; for example, in research units, research councils, colleges, Institutes, polytechnics or universities. Finally, he/she should explore the possibility of obtaining technical and financial assistance from outside sources, that is, from the international community.

1.2.4 Political Acceptability

In general, a researcher is advised to consider a topic which has the interest and support of the governments at local, state or federal levels. This will enhances the chance that the results of the study will be implemented. However, under certain circumstances a researcher may feel that a study is required to show that a government policy needs adjustment. In order to limit the chances of confrontation, one should in that case, make extra effort to involve the policy

makers concerned at an early stage.

1.2.5 Applicability

It is most likely that the recommendations from the study will be applied. This will not only depend on the blessing of the government but also on the availability of resources required for implementing the recommendations. The opinion of the potential clients and that of staff directly concerned with the problem will influence the implementation of the recommendations as well.

1.2.6 Cost-Effectiveness

The basic question here is: Are the resources of time, manpower and finances the researcher will be investing worthwhile given the findings? To answer this question the researcher needs to also know; what difference or change will the results of the study make to the existing programmes?

1.2.7 Timeliness

Here the researcher must of necessity consider this question: Will the findings of the study be available in time to enable the making of necessary decisions? A researcher needs to be clear on how urgent the results are required in order to make decision on which research should be conducted first and what can be carried out later.

1.2.8 Ethical Considerations

The question being considered here is: How acceptable will the research be to those who will be studied? (It is paramount that cultural and religious sensitivity of the study area be given careful and serious consideration). Imagine mounting a research work that pertains pig breeding and alcohol production in some states and areas where religion abhors and seriously frowns at eating of pork and alcohol consumption. Can informed consent be ensured to carry out the study? Has the condition of the subjects been taken into account? Have ethics on experimental animals been fulfilled? For example, if individuals or their crops/ animals are identified during the study as requiring treatment, will this treatment be given or accepted? What if such treatment interferes with the researcher's study results?

1.2.9 Environmental Considerations

Under this sub-heading, the following questions have to be answered correctly: Is the setting of the research experiment going to constitute an

environmental challenge to both humans and animals? Is it environmentally friendly? Is the research work going to reduce agricultural land and create a lot of canals that will eventually cause gullies and erosion? Consider conducting a research that involves nuclear energy in agricultural technology that is dangerous to human and animal lives. These factors also matter a lot.

1.3 Examples of Well Framed Project Titles

1) The Use of Donkeys, Camels and Oxen for Post Emergence Weeding of Farm Lands in North – Eastern Nigeria.

2) Comparative Evaluation of Animal and Plant Protein Intake in Northern Adamawa State, Nigeria.

3) Analysis of Water Supply Characteristics for Domestic and Agricultural Uses in Lala District, Gombi Local Government Area, Adamawa State, Nigeria.

4) Impact of Abattoir Waste on Aquatic Life: A Case Study of Yola Abattoir.

5) Evaluation of Fertility Rate in Friesian and White Fulani Breeds of Cattle Following Artificial Insemination.

6) Replacement Value of Yellow Sorghum *(Sorgum bicola)* Variety for Maize in Broiler Diets.

7) Highlights on the Use of Donkeys for Land Cultivation in Adamawa State, Nigeria.

8) Incidence of Repeat Breeding Syndrome in Cattle from Four Local Government Areas of Adamawa State, Nigeria.

9) Performance and Nutrient Digestibility of Rabbits Fed Urea Treated Cowpea Husk.

10) Characteristics of Reproductive Tracts of Repeat Breeders in Cattle.

11) Seasonal Performance and Feeding Characteristics of Sokoto Red Goats.

12) Foetal Wastage in Ruminants and Sustainable Livestock Industry in Nigeria.

13) Physico-chemical Characteristics of Water Available for Livestock and Human Use in Lala District, Gombi Local Government Area, Adamawa State, Nigeria.

14) Effect of Feeding Graded Levels of Decorticated and Un- Decorticated Neem (*Azadirachta indica*) Seed Meal on Laying Japanese Quail (*Coturnix coturnix japanica).*

15) Efficacy of Aduwa (*Balanites aegyptica*) Seed Cake on Gastro Intestinal

Worm Burden in Growing Chicken.

16) Seasonal Abattoir Foetal Wastage, Food Security and the National Economy.

17) Growth Performance of Japanese Quail (*Coturnix coturnix japanica)* Fed Graded Levels of Decorticated and Un- Decorticated Neem (*Azadirachta indica*) Seed Meal.

18) Trailing and Preservation of Local Breeds of Livestock for Sustainable Agriculture in Nigeria.

19) Comparative Evaluation of Live Weight with Market Prices of Rams in Mubi, Adamawa State, Nigeria.

20) Aspects of the Hematology and Serum Biochemistry of Sahel and Sokoto Red Bucks at Mubi, Adamawa State, Nigeria.

21) Effects of Nitrogenous Feed Supplements Utilization on the Performance of Red Sokoto Bucks Grazing Natural Vegetation in Bauchi, North-Eastern Nigeria.

22) Testicular Sperm Reserve of Sokoto Red and Sahel Bucks from Mubi Main Slaughter House, Adamawa State, Nigeria.

23) Role of Information and Communication Technology in Nigerian Livestock Industry.

24) Foetal Wastage in Goats and the Associated Economic Implications.

1.4 Preliminary Pages of a Final Year Student Project

After the successful choice of a project title, the write up should usually follow this pattern which is most often used in institutions of higher learning that run agricultural science based courses in Nigeria. The courses, ANS 599 or AGR 599 (Final year project for undergraduate students), AS 608 or PP 606 (Final year project for master's students) and AS 799 or PP 708 (Final year project for PhD students), are usually a four-unit and compulsory course in almost all the Universities of Nigeria. It is designed to expose all final year students to the basic tenets of research and project writing. It equally offers students the opportunity to handle equipment in relation to animals and crops and to appreciate day-to-day problems associated with agriculture.

Undergraduate final year project is just like an introduction to project and research or technical writing. Students may not necessarily be required to do much elaborate investigation. It may have few objectives, hypotheses and experiments. The scope may be short in length, questionnaires and simple

descriptive statistics are allowed as tools for research. Group project or joint authorship is also allowed to reduce expenses, encourage the lazy or weak ones and authenticate the work since two heads are better than one. It is expected that a research conducted by many researchers could carry more weight because of the different minds discussing the issue and ideas coming from individual contributions. All the researchers may not want to lie about their findings as compared to a single author that may seat down in one corner and cook up data which may not be reliable. The disadvantage of joint authorship is that, some unserious students may rely completely on the serious ones and may not participate fully and contribute technically in the research.

Master's and PhD work, otherwise known as thesis and dissertation, is a graduate students' research that may require thorough and in-depth investigation of the problem with so many research questions, objectives and at least three experiments to fulfill the requirement for the award of higher degree. The basic characteristic of a thesis or dissertation is its length. A work of this magnitude is the written proof of sustained research conducted over a long period of time, usually 18–36 months. Thesis and dissertation generally contain an extensive review of the literature as well as the results of several experiments which are aimed at testing a single hypothesis. Sample size should be large enough to give a good representative of the sample area. The entire thesis and dissertation work should range from 100 to 400 pages with 50 to 200 references and with up to 10 or more tables, figures and graphs. The postgraduate students are expected to master their work by studying it very well. Usually, it is an individual thing since they are assumed to have had experience in project or technical writing. They may require research assistants for extensive and adequate data collection. More advanced statistical tools are used in the analysis of the results in postgraduate programmes than undergraduate work for good and accurate precisions.

Projects embarked upon may be nutritional or field experiments, breeding, management, surveys etc. The entire work is grouped into five or six chapters apart from the title page and abstract. At the end of the second semester in 500, 600, 700 or 800 level, as the case may be, each student is expected to present a seminar paper, participate in oral examinations or defend his/her project, if research is undertaken independently. However, where group or joint project is written and submitted to the department or post graduate school, all the authors will appear before the defense committee to defend their work. But, in every case, bound copies of the work are submitted according to the following sub-headings:

1.4.1 Cover Page/Binding

This refers to the hard cover that binds and packages the entire work together for proper handling and shelving. It also gives room for easy consultation and referencing as a primary source of literature. The colour of the cover page depends on the programme, school or faculty and the institution. In most Nigerian colleges, polytechnics and universities, green is the popular colour normally used by the undergraduate students and purple for post graduate students in faculties of agriculture and agricultural engineering.

1.4.2 Title Page

This is the first page which shows the title of the research or project work. It also carries names and registration number of the student or the researcher, department, school or faculty and the institution. It also shows purpose of the work which fulfills the requirements for the award of the certificate to be obtained and the year in which the research has been conducted and presented. Examples of title page written by different students from different institutions are given below:

a. Organic and Conventional Farming among Livestock Owners in Mubi North Local Government Area of Adamawa State, Nigeria.

By
Abu, Keliya
(SAT/AHP/DAHP/08/02)

Being a Project Submitted to the Department of Animal Health and Production Technology, School of Agricultural Technology, Federal Polytechnic, P. M. B. 35, Mubi, Adamawa State, Nigeria, in Partial Fulfillment of the Requirement for the Award of Diploma Certificate in Animal Health and Production Technology.

December, 2010

b. Comparative Evaluation of Animal with Plant Protein Intake in Mubi North Local Government Area of Adamawa State, Nigeria.

By
Imranatu, Usman (SAT/ND/AHP/07/17),
Adamu, Umar (SAT/ND/AHP/07/20),
James, Tizhe (SAT/ND/AHP/07/14) and
Musa, Saleh (SAT/ND/AHP/07/12)

Being a Project Submitted to the Department of Animal Health and Production Technology, Federal Polytechnic, P. M. B. 35, Mubi, Adamawa State, Nigeria, in Partial Fulfillment of the Requirement for the Award of Diploma Certificate in Animal Health and Production Technology.

December, 2009

c. Incidence of Repeat Breeding Syndrome in Cattle Herds in Four Selected Local Government Areas of Adamawa State, Nigeria.

By
Ibrahim, Hayatu Kubkomawa (B. Tech., F.U.T. Yola)
(M.Tech./AS/06/0191)

A Thesis Submitted to the Postgraduate School, Federal University of Technology, Yola, Adamawa State, in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Technology in Animal Production and Management.
Department of Animal Science and Range Management, School of Agriculture and Agricultural Technology, Federal University of Technology Yola, Adamawa State, Nigeria.

June, 2010

d. Effects of Breed, Year, Season, and Age on Some Reproductive, Fecal Egg Worm Count and Haemato-Biochemical Parameters of Sahel and Sokoto Red Goats in Mubi, Adamawa State, Nigeria.

By
Malachi, Albert Tizhe
(PGS/Ph.D/2005 – 2006/1020225)

A Thesis Submitted to the Postgraduate School, Abubakar Tafawa Balewa University, Bauchi, in Partial Fulfillment of the Requirements for the Award of Doctor of Philosophy in Animal Science, Animal Production Programme, School of Agricultural Technology, Abubakar Tafawa Balewa University, Bauchi, Nigeria.

December, 2006

1.4.3 Declaration

This is a statement made by a student or a researcher indicating genuineness and originality of the work, showing novelty to avoid plagiarism and

duplication of ideas. The statement is signed or endorsed by the student in question. See examples below:

a   I hereby declare that, this thesis was composed and written by me and that it is a record of my own research work. It has not been presented before in any previous application for a higher degree. References made to published and consulted literature have been duly acknowledged.

_____   _____

          Signature   Date

Ibrahim, Hayatu Kubkomawa

(Student)

b.   I hereby declare that, this thesis was written by me and it is an original record of my research work. It has not been presented in any previous application for a higher degree. References made to published literature have been duly acknowledged.

_____   _____

          Signature   Date

Malachi, Albert Tizhe

(Student)

The above declaration is confirmed.

_____   _____

          Signature   Date

Prof. I. S. R. Butswat.

(Supervisor)

1.4.4 Approval Page/Certification

This is a formal declaration made by a student or a researcher that the research work has been truly read by his supervisor(s) or examiner(s) and found to meet the minimum requirement for the award of the certificate in view. The statement is then endorsed by the student, supervisor(s) or examiner(s) and the head of department. It always appears on the preliminary pages as can be seen below:

a   This is to certify that this project work titled: Organic and Conventional Farming among Livestock Owners in Maiha Local Government Area of Adamawa State, Nigeria is an original work carried out by me. It has been read and found to meet the requirement for the award of National Diploma Certificate in Animal Production, in the Department of Animal Health and Production Technology, Federal polytechnic, P. M. B. 35, Mubi. Adamawa State, Nigeria.

Project Supervisor   _____

Mr. Kubkomawa, H. I.   Signature and Date

Head of Department   _____

Dr. Malachi, A. Tizhe   Signature and Date

b   This Thesis entitled, "Incidence of Repeat Breeding Syndrome in Herds in Four Selected Local Government Areas of Adamawa State" submitted by Ibrahim, Hayatu Kubkomawa meets the regulations governing the award of Master of Technology of the Federal University of Technology, Yola and has been examined by:

_____   _____

Signature   Date

Prof. I. S. R., Butswat

External examiner

_____   _____

Signature   Date

Dr. M., Akpan

Internal Supervisor

_____   _____

Signature   Date

Dr. Yahaya, M. Sani

Major Supervisor

_____   _____

    Signature   Date

Prof. Nur, A.

Dean, Postgraduate School

c   This Thesis titled, Effects of Breed, Year, Season, and Age on some Reproductive, Fecal Egg, Worm Count and Haemato-biochemical Parameters of Sahel and Sokoto Red Goats in Mubi, Adamawa state, Nigeria by Tizhe, Malachi Albert, meets the regulations governing the award of the degree of Doctor of Philosophy of the Abubakar Tafawa Balewa University, Bauchi, and is approved for its contribution to knowledge and literary presentations.

_____   _____

    Signature   Date

Prof. I. S. R., Butswat

Major Supervisor

_____   _____

    Signature   Date

Dr. U. D., Doma

Co-supervisor of committee

_____   _____

    Signature   Date

Dr. U. D., Doma

Programme Co-coordinator

_____   _____

    Signature   Date

Prof. D. S., Matawal

Dean, School of Postgraduate Studies

1.4.5 Dedication

This is a written statement made by an author mentioning somebody's name(s) or some people's names or some organizations or some government department, ministry, parastatal, or names of some institution(s), college department etc. at the beginning of his book or thesis to show gratitude and friendship or remembrance of that person(s). Usually, people dedicate their books or theses to their beloved ones like parents, children, spouses and Almighty God as shown in the examples below:

a This Project work is dedicated to Almighty God and my beloved family members.

b This Thesis is dedicated to my family members and the entire Lala Community in Nigeria and the diaspora.

c This Project is dedicated to Almighty God and my parents, Mr. Adiel Elisha and Mrs. Margaret Adiel.

d This Thesis is dedicated to God Almighty, the Merciful and Omnipotent, my Shield, Strength and Strong hold. To Him be the Glory, Forever and ever, Amen.

1.4.6 Acknowledgements

This is an expression of thanks by a writer to people that have contributed immensely towards the success of his research work, book or thesis and life in general. Friends, relations, spouses, teachers, supervisors and mentors or role models are usually acknowledged in the beginning of the write up. In some cases other authors, whose books have been consulted, are as well acknowledged. Sometimes, organizations (international and local), government departments, ministries, parastatals or institutions may also be acknowledged for their materials used. It is also found on the preliminary pages. Examples of acknowledgements made by different successful scholars are given as follows:

a My greatest thanks go to Almighty God for giving me this opportunity, grace, strength, wisdom and understanding for the successful completion of this project work.

I wish to express my appreciation to my project supervisor, Mr. Kubkomawa, H. I., for his open mindedness, support and care during my project writing and others that their names are not mentioned. God bless you all for your support and care for me to become what I am today. My warm appreciation also go to my family members, the likes of Mr. and

Mrs. Keliya, Garba and Thanko, I. Bassina for their maximum support and encouragement that enabled me to complete my studies successfully. I also want to acknowledge all my class mates for their optimum cooperation throughout our stay in the polytechnic. God bless you all, Amen.

b My greatest thanks go to Almighty God. To him is the glory for giving me abundantly the grace, zeal, patience, strength, wisdom and understanding to undergo this advanced graduate programme and also for seeing me to a successful completion of this research work.

I sincerely wish to express my profound gratitude and unreserved appreciation to my supervisors, Prof. A., Kibon and Dr. M. S., Yahaya for their open mindedness, selflessness, constructive criticism and dedication towards the actualization of the research work. My sincere gratitude also go to Dr. Bobbo Goniwa Aminu and other members of academic staff of the department for their all-time encouragement and counseling throughout my stay in the university.

I wish to say a big thank you to my Aunt, Madam Kauna Biyantu Atiko and her husband, Mr. Geoffrey Atiko, Felicia Ibrahim Bachure, E. K. Micah Dingai, Dr. Hassan Mai, Dr. Abdulkadir and the entire Kofare people for their understanding encouragement and support for me to forge ahead and ensure the conclusion of the research work.

c First of all, my greatest appreciation goes to Almighty God for guiding me throughout my school life and through the completion of this write up. I wish to express my profound gratitude to my able supervisor in the person of Mrs. Ogungbe-faji Elizabeth O., for her effort to see that this project has become a success by reading through the entire manuscript. Also my sincere and deep appreciation goes to my father, Mr. Adiel Elisha for shouldering the financial responsibilities throughout my academic pursuit.

I appreciate the contribution of Pastor Hayatu Yusufu, Obida B. Labis, Mr. Dauda Labidi, Usman Ado and Torate. I also appreciate my brothers, sisters and course mates for their contribution both materially and financially which is a pre-requisite to the success of this research and my educational pursuit entirely. I say thanks to them all and God bless.

d I am most grateful to God Almighty for giving me the courage, strength and perseverance and for preserving my life from the beginning to the end

of this study. My sincere and profound gratitude goes to my major supervisor, Prof. I. S. R., Butswat for the rich ideas, constructive criticisms, educative suggestions, fatherly advice and care he rendered to me during the course of this study to see that this study becomes a reality. God that sees and understands human minds and hearts will surely reward him with lots of blessings that man cannot give. I as well thank and appreciate Dr. U. D., Doma, my co-supervisor, for his concern and words of encouragement, especially, when I was critically sick. Sir, you stood by me in times of trials and difficulty, your words were a source of encouragement that strengthened me to carry on with this work.

My profound gratitude also go to Dr. Pam Mancha, who stood by me throughout the period of this study. His constructive guidance and technical advice made this study meet the standards desired. The effort made by Mr. Ezekiel Waba to see that the data for this study was statistically analyzed is highly appreciated. I acknowledge the contributions of my noble lecturers; Prof. S. T., Mbap, Prof. A., Kibon, Prof. Adebitan, Prof. Adegbola and Mr. Demo, K; they have been sources of inspiration to me throughout the period of the study. I am highly indebted to Dr. Addass, A. P and the technologist in charge of Animal Physiology Laboratory, Adamawa State University, Mubi, who helped in sample collection and analyses especially when I was ill. I thank Dr. Mustapha, M. Barau, Rector Federal Polytechnic, Mubi and the entire members of the management for sponsoring this programme. I appreciate the support given to me by the entire members of the Department of Animal Health and Production, Federal Polytechnic, Mubi and friends/relations like Dr Francis Zira, Louis, T. Buggu and Danbiyu, T. I, in a special way, thank my beloved wife, Theresa, My children: Marilyn, Matthew, Matthan, Michael and Martins, my mother Roseline Tizhe, and brothers Cosmas, James and Tumbadakwa for their patience and support. The hurdles are over and the long and late nights in the laboratory which denies you fatherly care in the course of analyzing the samples for this study is a forgone issue. Finally, I remain grateful to my late father, Tizhe-Yantra, for laying a solid foundation for my educational pursuit. Dad, you did not enjoy the fruit of your hard labour, but God that made it so will reward you. And may your gentle soul rest in perfect peace, amen.

1.5 Abstract

In scientific and technical writing, the abstract is usually the summary of your

study. The abstract should clearly summarize the important and salient findings of the study. It should be brief but contain hard facts and actual values. An abstract should state clearly the objectives of the study; describe methodology, important results, mentioning the meaning in terms of significance and possible implications of the work and conclusion. Do not use abbreviations that are only explained in the text. Do not include references in the abstract. Do not refer to the figures, graphs, tables and pictures. Abstract should be written in single line spacing without paragraphs. It should be substantial, informative and adequate, preferably up to 250 words and above, depending on the scope of the work. For example, journal article could carry fewer words in the abstract compared to under graduate project to Master's degree thesis and PhD dissertation, respectively. It is expected that, undergraduate project should carry fewer objectives than post graduate work, which many at times will require three or more experiments to fulfill the requirements for the award of higher degrees. Abstract is written on the preliminary pages. Examples of good abstracts are:

a. The study investigated the incidence of repeat breeding syndrome in cattle and determined the progesterone profile of repeat breeders in four Local Government Areas of Adamawa State, Nigeria. Data were obtained from individually identified repeat breeders on herd basis by the aid of herdsmen and the use of farm records where available. One hundred herds were visited during the study, made up of 25 from each Local Government Area. One hundred and seventy one (171) blood samples were collected from 57 identified repeat breeders. From each repeat breeder, 5 ml of blood was collected through the jugular vein using a 10 ml syringe. This was done three times on weekly basis to cover the length of the estrus cycle. Thereafter, serum was separated into plain vials by centrifugation and stored at 4^OC prior to determination of progesterone levels. Serum progesterone concentration was estimated using Enzyme-Linked Immunosobant Assay (ELISA) technique. Data generated were subjected to descriptive statistics and analysis of variance (ANOVA) to estimate the level of significance and the proportion of repeat breeder syndrome in the study area. One hundred herds were sampled during the study and fifty-seven repeat breeders were identified. The proportions of repeat breeding syndrome within the four Local Government Areas were given as 1.59, 1.28, 1.49, and 1.71% for Girei, Yola North, Yola South, and Fufore respectively. The overall incidence was 6.08%. Seven of the repeat breeders were pregnant, ten cyclic and forty non– cyclic. There was no significant variation in the progesterone profile of the non-cyclic repeat breeders during weeks 1 and 2 ($p>0.05$) and 2 and 3 ($p>0.05$). However, there was significant variation during weeks 1 and 3 ($p<0.05$). The

progesterone concentration of the pregnant repeat breeders was not significantly varied during weeks 1 and 2 ($p>0.05$), varied significantly within the weeks 1 and 3, at 51.5 ± 0.8944 and 50.2 ± 0.089ng/l ($p<0.01$) respectively and 2 and 3 ($p<0.014$). The progesterone levels of the cyclic animals were extremely varied within weeks 1 and 2 ($p<0.001$); 1 and 3 ($p<0.001$) and 2 and 3 ($p<0.001$). Repeat breeding syndrome is a multi-factorial condition, which has become a major source of economic waste in the cattle industry due to the need for more inseminations or services, increased calving interval, reduced milk production and increased culling rates.

b. The study was conducted to describe the socio-economic characteristics of livestock producers, determine sources, type of information and communication technology obtained, assess level of utilization and effect of information and communication technology on the Nigerian livestock industry. Data were obtained through random administration of 1000 questionnaires to livestock producers and oral interview of herdsmen. Results showed that seventy percent (70%) of the livestock producers contacted were men, 45% were between the ages of 31 and 49 years old, 65% of the livestock producers are married with 30, 20 and 10% having OND/NCE, Nomadic education and degree qualifications, respectively. Also, 50, 40 and 10% of livestock owners are Moslems, Christians and traditional believers, respectively. While, 60% are fulltime farmers, 35 and 5% are absentee farmers (civil servants) and students, respectively. Farmers are more familiar with radio (50%), mobile phones (20%) and television (15%) than internet (5%), magazines(5%) and newspapers (5%). About 30% of the livestock producers use ICT to watch football and other sporting activities, 20% to obtain agricultural information and 20% use ICT for political news, whereas 5% use ICT to obtain health information and 5% as business outlet, 10% also use ICT for entertainment and 10% for religious news. Only 30% of the farmers agreed that ICT have positively impacted on their livestock agriculture while 70% confirmed that they have not been able to coordinate and harness information obtained from ICT to improve their productivity in livestock agriculture. This showed that there is still limited level of awareness on the use of ICT to improve and enhance livestock production in Gombi Local Government Area of Adamawa state, Nigeria.

c. The study was carried out to evaluate the characteristics of water supply for domestic and livestock uses in Lala District of Gombi Local Government Area (LGA), Adamawa State, Nigeria. Questionnaires, oral interviews and visual observations were used to generate data on sources of water supply, distance traveled to collect water, time spent fetching

water and different water uses. It was revealed that, most of the inhabitants depend on hand pump boreholes (37.0%), water vendors (25.5%), hand-dug wells (15%), streams (13%) and public overhead tanks (9.5%). Thirty four percent of the respondents traveled less than 1000 m, 33% traveled 500 m, while another 12.5% traveled more than 200 m to collect water. Only 20% traveled about 100 m to collect water from their hand-dug wells, boreholes and taps. Forty five percent of inhabitants fetch water at no specific time, 34.5% in the mornings, 11% in the afternoons and 9.5% in the evenings. Seasonal variations in the water table within the study area, leads marked shortage of portable water, especially during the dry season. The findings indicated that water was used essentially for human consumption, laundry, cooking, and for livestock. Water supply in the area was, however, insufficient and irregular for both human and livestock uses.

d. The study was conducted to evaluate testicular sperm reserve of red Sokoto and Sahel bucks in relation to effects of year, season, breed, age, live weight and body condition score. A total of 32 bucks of 12 months old comprising 16 from each breed were obtained from small scale subsistence farmers at Mubi livestock market. These animals were raised across four seasons, early dry and late dry, early wet and late wet for the period of two years. Animals were aged by dentition method, weight determined by clinical weighing scale and body condition scores determined using Scale six grades 0–5. Scrotal circumference was determined in cm using a flexible metric tape before the animals were slaughtered. Testicular measurements were carried out post-mortem and the testes preserved in an ice box before being taken to the laboratory. The gonadal and epididymal sperm reserve were determined. The results revealed that, there were no significant differences ($p>0.05$) among variables RTSR, LTSR and PTSR for the years 2008 and 2009. But significant ($p<0.001$) seasonal effect was observed, with early dry season having the highest values followed by late wet season and early wet season having the least values among the variables. Least sperm reserve values for right, left and paired testes were observed during the early wet season. Also, a significant ($p<0.001$) breed difference was observed with respect to testes sperm reserves, with largest volume in Sahel bucks, while the values in Sokoto Red were lower. Age group variability significantly ($p<0.001$) influenced sperm production ability of bucks. The age group ≥3 years recorded the highest sperm reserves. Correlation matrix showed significant ($p<0.001$) positive correlation ($r=0.58, 0.75, 0.69, 0.77, 0.76, 0.67, 0.77,$ and $0.78,$) between live weight, BCS, SC, WLTLG, WLTVL, WLTWT, WRTLG, WRTVL, and WRTWT. Very highly significant

(p<0.001) negative correlations (r-values) were observed between age, season and humidity and all testicular parameters measured. Testicular variables and testicular sperm reserves showed very highly significant (p<0.001) correlation (r-values) between live weight and all other variables, and highly significant (p<0.001) negative correlation (r-values) between age, humidity and the rest of the variables. It is concluded that, goats are very conscious of seasonal variation in the quality, availability of crop residues and liberty to select, scavenge with aversion to high humidity. These affect their general performance in life. Livestock producers are advised to take note of these findings to enable them plan adequately in order to achieve their targets.

e. The objective of this review is to highlight the technologies used for determination of feed intake and digestibility in ruminant animals. N-alkanes, saturated, aliphatic hydrocarbons with length varying from 21 to 37 carbon atoms are used successfully by many researchers to determine feed intake and digestibility in ruminant animals. N-alkanes are parts of the cuticular wax of plant leaves and usually are ether extract which are indigestible in nature. The oral administration of n-alkanes has been used in digestibility trials with domestic and wild ruminants as well as monogastric animals to measure feed digestibility and feed intake of the available herbage. N-alkanes can be supplied to animals in different forms. Some studies have used Pelleted feed made of paper strip embedded with synthetic n-alkanes as external markers to estimate feed intake of sheep. Similarly, sheep were fed with n-alkanes (C_{28} and C_{32}) in the form of gelatin capsules of powder cellulose, previously added with a known amount of n-alkane dissolved with n-hexane or n-heptane, to estimate forage intake. Some researchers have developed a different method that consisted of mixing n-alkanes with solvents and powder cellulose, resulting in a homogenous suspension that, after being evaporated and dried, was inserted into gelatin capsules. Another technique in which particles of *Pennisetum clandestinum* were mixed with n-alkanes suspended in a xanthan gum (0.4%) and infused into the rumen of sheep using either dose guns or disposable syringes. Some studies reported that between-species differences in n-alkane profiles could also be used to determine the proportion of each plant species in the diet. In the same vein, indigestible internal plant markers such as lignin and acid detergent fibres are also used to determine digestibility in ruminants. Grazing time alone cannot be used to determine dry matter intake of grazing animals because intake rate also must be considered. To evaluate the preferred diet intake of grazing animals, it is necessary to spatially separate the forages being evaluated to eliminate the constraints that occur within an intimately

mixed sward. Because plant species or parts can differ markedly in nutritive value, the botanical composition of consumed herbage can have a profound effect on the provision of nutrients to the animal. In an agricultural context, this is especially relevant for grass/legume mixtures, because the consumption of legume will usually result in better animal performance. For rangeland cattle, the higher consumption of some plant species rather than others not only has nutritional effects on the animal but can also have an important influence on the species composition of the plant biomass, with consequences for ecological sustainability.

f. The study was carried out to investigate the feeding management of pastoralist cattle and conflict resolution strategy of Fulani pastoralists in tropical humid rain forest zone of Imo state, Nigeria. Data was generated with the aid of questionnaires, personal interview, field measurement and observations. Frequency tables were used to give a presentation of the information obtained. The results showed that, 77.3% of pastoralists' cattle holdings are White Fulani (Bunaji), produced for breeding and dual purposes. The results revealed that, 100% of pastoralists allow calves between the ages of 0-8 weeks to suckle their dams for six to nine months for colostrum and fast growth. The results revealed as well that, there are no special feed offered to the cattle during breeding seasons. The animals virtually depend on the natural available pastures for nutrient requirements. But 100% of the pastoralists offer salt lick to their cattle to supplement for minerals obtained from forages. The results revealed that, 100% of Fulani pastoralists take their herds to the streams and rivers sides to drink water and not dams, reservoirs, bored holes, wells or tap water. The diversity and ever green forages and fodder make it possible for year round feed supply to the cattle. The results revealed that, 81.8% of pastoralists have had conflicts with indigenous crop farmers because of animals destroying crops during herding in the study area. However, conflicts with crop farmers threaten pastoral access to shared material resources, thus, impacting negatively on the sustainability of pastoralism in the forest zones. The results had it that, 13.60% of pastoralists have had cases of animal theft, while 4.60% claimed not to experience any case of animal theft. It was concluded that, conflict resolution strategies were through village heads, town authorities and the Army. In Nigeria, the clashes between the Fulani and crop farmers have intensified as desertification, deforestation, and climate changes continue unchecked by successive governments. It is recommended that adequate information be given to Fulani pastoralists on better and improved feeding methods. The cattle rears and crop producers are important contributors to the economy

of the region. There is a need to provide grazing routes to solve the issue of conflicts that always result to blood bath in Nigeria.

1.6 Table of Contents

This is the list of items that appear in the text in a summary way indicating the pages for each item for easy referral and proper citations by all readers who may want to consult the write up. It gives the reader an easy summary of the book at a glance and grasps attention of the reader to make the book a must-read. This also appears on the preliminary pages of the researcher's write-up.

1.6.1 List of Tables

All the tables used to present results and findings of a research work are summarized under this sub- heading.

1.6.2 List of Figures/Abbreviations

This gives a summary of all pictures or photographs, graphs, bar charts, histograms, pie charts or any short form of writing long words that were used to explain the result. The titles of figures are given at the bottom of the pictures not on top like in the case of tables. These are usually attached at the back or in some cases in the text as figures 1, 2, 3 and 4 and below a table (abbreviations).

1.6.3 List of Appendices

This is a summary of all analyzed result tables and other data obtained during the research work which has not been used, instead of discarding them, they are sent to the appendices at the last page of the write up for future use.