

**REVISED CURRICULUM
OF
LIVESTOCK MANAGEMENT**

Curriculum Development Project
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CURRICULUM DIVISION, UGC

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PREFACE

Curriculum of a subject is said to be the throbbing pulse of a nation. By looking at the curriculum of a subject, one can judge the state of intellectual development and the state of progress of a nation. The world has turned into a global village, new ideas and information are pouring in a constant stream. It is, therefore, imperative to update our curricula by introducing the recent developments in the relevant fields of knowledge.

In exercise of the powers conferred by Sub-section (1) of section 3 of the Federal Supervision of Curricula Textbooks and Maintenance of Standards of Education Act 1976, the Federal Government vide Notification No.D773/76-JEA (Cur.), dated December 4, 1976, appointed University Grants Commission as the Competent Authority to look after the Curriculum Revision Work beyond Class XII at Bachelor level and onwards to all Degrees, Certificates and Diplomas awarded by Degree Colleges, Universities and other Institutions of higher education.

In pursuance of the above decisions and directives, the Commission is continually performing curriculum revision in collaboration with the Universities. According to the decision of the 44th Vice-Chancellors' Committee, curriculum of a subject must be reviewed after every 3 years. For the purpose, various Committees are constituted at the national level comprising senior teachers nominated by the Universities. Teachers from local degree colleges and experts from user organizations, where required, are also included in these Committees.

The Curriculum Revision Committee on Livestock Management in its meeting held in May, 2001 at the U.G.C. Regional Centre, Lahore finalized the draft curriculum after due consideration of the comments and suggestions received from the Universities and Colleges where the subject under consideration is taught.

The Final draft prepared by the Curriculum Revision Committee duly approved by competent authority is being circulated for implementation by the Universities.

(PROF. DR. ALTAF ALI G. SHAIKH)
ADVISED (C&T)

May, 2001

INTRODUCTION

A meeting of the National Curriculum Revision Committee to finalize the draft curriculum of Livestock Management prepared in preliminary meeting was held on May, 24-26, 2001 at UGC, Regional Centre, Lahore. The following attended:

1. Prof. Dr. Mushtaq Ahmad Mian
Dean,
Faculty of Animal Husbandry and Vet. Sciences,
NWFP Agricultural University, Peshawar. Convener
2. Prof. Dr. Bakht Baidar Khan,
Professor Emeritus,
Nominee,
Pakistan Veterinary Medical Council,
Islamabad. Member
3. Mr. Muhammad Haroon Baloch,
Assistant Professor,
Department of Livestock Management,
Sindh Agriculture University, Tandojam Member
4. Dr. Muhammad Ashraf Mirza
Principal Scientific Officer/Director,
Animal Sciences Institute,
National Agricultural Research Centre,
Islamabad. Member
5. Dr. Nasir Hussain Shah
Director,
Veterinary Research Institute,
Government of NWFP, Peshawar. Member
6. Dr. Ahsan ul Haq
Professor of Poultry Husbandry,
University of Agriculture,
Faisalabad. Member
7. Lt. Col. Qamar Riaz
Headquarter,
Lahore Log Area (Nominee of GHQ)
Lahore Cantt. Member
8. Dr. S. Yasir Raza,
Lecturer,
Institute of Animal Husbandry and Vet. Sciences,
Gomal University, D.I. Khan. Member
9. Mr. Nisar Ahmad
Lecturer,
Animal Husbandry Section, Member

College of Veterinary Sciences, Lahore.

10. Dr. Hafiz Muhammad Abdullah Member/Secretary
Associate Professor,
Department of Livestock Management,
University of Agriculture,
Faisalabad.

Dr. M. Akhtar Qureshi, Assistant Professor, University College of Agriculture, Rawalakot, AJK, Mr. Tanveer Ahmad, Lecturer, Department of Animal Sciences, Arid Agriculture University, Rawalpindi and Mr. Nazim Hussain, Lecturer, College of Agriculture, B.Z. University, Multan could not attend final meeting due to their pre-occupation.

The meeting started with recitation from the Holy Quran by Dr. Hafiz Muhammad Abdullah.

Mr. Muhammad Javed Khan, Director Curriculum, UGC, welcome the participants and briefed them of the obligations of the Commission for review, revision and development of curricula as per provisions of the Act of Parliament, 1976. He told the committee that the draft curriculum of **Livestock Management** for D.V.M., B.Sc.(Hons.) Animal Husbandry four years degree programme, M.Sc. (Hons.) and Ph. D. prepared in preliminary meeting held on March 15-17, 2001 will be finalized in light of comments received on the first draft from universities and expert bodies and in light of recommendations formulated by the members of the committee after discussing the draft with their colleagues.

The Director further informed the members that refurbishing the curricula of subjects in animal husbandry and veterinary sciences was being carried out by the financial support of the Ministry of Science and Technology. He described the objective behind the whole exercise as to **inculcate latest knowledge** amongst the future graduates to enable them to enhance the production of milk, meat and dairy products in Pakistan, which would yield positive impact on the economic uplift of farmers and growers. The Director introduced the members of the committee of the different academic programmes of the commission and Ministry of Science and Technology aimed at enhancing the academic capability of in-service university/college teachers. He suggested to the members to devise the minimal baseline curriculum, which every university/college imparting education in this economically important sector like livestock should offer. He emphasized inclusion of the latest books in the list of suggested readings so that new concepts and ideas are imparted to future graduates.

The Committee unanimously appointed Prof. Dr. Mushtaq Ahmad Mian as its convener and Dr. Hafiz Muhammad Abdullah as Secretary. The committee in order to realize the above aim agreed to the unified draft curricula as detailed below:

**LIVESTOCK MANAGEMENT COURSES
FOR
B.Sc.(Hons) A.H/Agri/RHE/DVM Classes**

<u>Course No.</u>	<u>Title</u>	<u>Credit Hours</u>
LM-311	Introductory Livestock Management	3(2-2)
LM-312	Camel and Equine Management	4(3-2)
LM-313	Management of Farm Animals (For DVM, and B.Sc.(Hons)Agriculture)	4(3-2)
LM-314	Dairy Farming (For B.Sc. Rural Home Economics)	4(3-2)
LM-411	Range Livestock Management	3(2-2)
LM-412	Small Ruminant Production	4(3-2)
LM-511	Management of Dairy Animals	4(3-2)
LM-512	Principles of Milk Production	4(3-2)
LM-513	Farm Practice	2(0-4)
LM-516	Management of Range Livestock (for Forestry Major Class)	2(1-2)
LM-611	Principles of Meat Production	4(3-2)
LM-612	Internship in Livestock Management	5(0-10)

LM-311 INTRODUCTORY LIVESTOCK MANAGEMENT 3(2-2)

Theory

Definition; importance of livestock management; characteristics of a good farm manager; livestock population and its trends; role of farm animals in the national economy; interrelationship between animal and crop agriculture; zoological classification; domestication of farm animals; glossary; types and breeds of livestock; principles of farm animal management; importance and objectives of housing; farm sanitation and waste disposal; transportation of farm animals; quarantine measures; behaviour and welfare of farm animals.

Practical

Methods of approaching, handling and restraining animals; regions and points of body; grooming and cleaning; identification of various breeds of farm animals; methods of identification; preparing gestation charts; determining weight of animals from body measurements; measuring physiological norms; preparing animals for shows; leading animals; visit to livestock fairs.

Books Recommended

1. Banerjee, G.C. 1998. A Textbook of Animal Husbandry. Oxford and IBH Publishing Co., New Delhi, India.
2. Raza, S.H., S. Ahmad and A. Iqbal, 1998. Ready Recknor for Animal Scientists. Soft Logo, University of Agriculture, Faisalabad.
3. Shah, S.I. 1994. Animal Husbandry. National Book Foundation, Islamabad, Pakistan.
4. Khan, B.B., M.A. Assad, M.T. Ch., M. Younas and A.S. Ch. 1983. Practical Manual for Introductory Livestock Management Courses. Mashhoor Printing Press, Aminpur Bazar, Faisalabad.

LM-412 SMALL RUMINANT PRODUCTION 4(3-2)

Theory

Distribution of small ruminants in the world; development of small ruminant industry in Pakistan; scope and importance; role in national economy; breeding, selection and conservation, kidding/lambing, feeding, rearing and housing; systems of production; sheep and goat as wool, meat and milch animals; measures for increased production; establishing commercial flocks; characteristics and utility of wool, hair/mohair; shearing and handling wool/hair; small ruminants on ranges; transportation and marketing; slaughter and flaying; selection and showing of sheep/goats; keeping flock healthy; common ailments.

Practical

Identification of sheep and goat breeds; judging for milk, meat and wool/hair production; farm practices such as marking castration, trimming of feet, milking, milk suckling, nursing orphan kids/lambs, docking, drenching, dipping, foot bath and spraying; determining the age by teeth; use of marking harness; pregnancy diagnosis; shearing and handling (grading and sorting) wool; examination of hair, wool and mohair; flaying and skin preservation; computerized record keeping; vaccination and preventive measures; shepherd calendar; preparing feasibility reports; visit to sheep and goat farms.

Books Recommended

1. Steele, M. 1996. Goats. McMillan Education Ltd., London.
2. Mackintosh, J.B. 1993. Sheep Production in Pakistan. PARC., Islamabad.
3. Anonymous. 1992. Sheep Production Handbook. American Sheep Industry Association. Englewood, CA., USA.

4. Ensminger, M.E. and R.O. Parker. 1986. Sheep and Goat Science. Interstate Printers and Publishers Inc. Danville, Illinois, USA.

LM-313 MANAGEMENT OF FARM ANIMALS 4(3-2)
(For DVM, and B.Sc. (Hons.) Agriculture)

Theory

Importance and functions of various farm animals; basic terminology; statistics of livestock population and products; important types and breeds of farm animals; general management practices; feeding management; care of young and stud stock; housing; farm sanitation and waste disposal; environmental issues and animal production; farm records; rules for proper milking of dairy animals; composition of milk and milk products; characteristics of wool, hair and mohair; horse and camel as farm animals; transportation and welfare of farm animals.

Practical

Approaching animals; points of the body; handling and restraining; identification of dairy, sheep and goat breeds; record keeping by using computers; judging livestock; application of various management practices and tools; housing plans; routine tests for determining quality of milk; fitting and conducting animals at livestock shows; visit to livestock farms/shows.

Books Recommended

1. Banerjee, G.C. 1998. A Textbook of Animal Husbandry. Oxford and IBH Pub., Co., New Dehli, India.
2. Shah, S.I. 1994. Animal Husbandry. National Book Foundation, Islamabad, Pakistan.
3. Ensminger, M.E. 1993. Animal Science. The Interstate Printers, Danville, Illinois, USA.
4. Barrick, R.K. 1988. Animal Production and Management. McGraw Hill Book Co., New York, USA.
5. Khan, B.B., M.A. Assad, M.T. Ch., M. Younas and A.S. Ch.1983. Practical Manual for Introductory Livestock Management Courses. Mashhoor Printing Press, Aminpur Bazar, Faisalabad.

LM-314 DAIRY FARMING 4(3-2)
(For B.Sc. Rural Home Economics)

Theory

Dairy animals of Pakistan; dairy breeds; role of dairy farming in national economy; role of women in dairying; principles of profitable dairy farming; general management practices; care and management of calves, youngstock, pregnant and lactating animals; feeding dairy animals; housing and farm sanitation; waste disposal; farm records; rules for proper milking of dairy animals; hygienic milk production and preservation; composition of milk and milk products; nutritive value of milk; marketing of milk and milk products; common ailments of dairy animals.

Practical

Approaching and handling dairy animals; identification of dairy breeds; practice of milking; judging dairy animals; plans for economical housing; physical and chemical evaluation of milk; cost/benefit analysis of a dairy enterprise.

Books Recommended

1. Shah, S.I. 1994. Animal Husbandry. National Book Foundation, Islamabad, Pakistan.

2. Thomas, C.K. and N.S.R. Sastry. 1991. Dairy Bovine Production. Kalyani Pub. New Dehli, India.
3. Schmidt, G.H., L.D. Van Vlek and M.F. Hutjens. 1988. Principles of Dairy Science. Prentice Hall Inc., Englewood Cliffs, New Jersey, USA.
4. Etgen, W.M., J.E. Robert and P.M. Reaves. 1987. Cattle Feeding and Management. John Willey and Sons, New York.

LM-411 RANGE LIVESTOCK MANAGEMENT 3(2-2)

Theory

Introduction to ranges; basic concepts and terminology; ecological zones of Pakistan; soil, plant and animal relationship; erosion and pollution; various range animals; vegetation manipulation for improved livestock production; important range and cultivated grasses/pasture, trees and shrubs as animal feed; grazing management systems and supplementary feeding; management of livestock during drought; grazing capacity and stocking rate; effect of climate on animals and vegetation; development of water points; shelters and fencing on ranges; protection from predators/wild animals; poisonous plants and their hazards; disease prevention on ranges.

Practical

Visits to rangelands; identification of various range grasses, trees, shrubs and cultivated forages; collection/mounting of important range vegetation samples; determining range carrying capacity and forage production; animal units and stocking rates; animal off take rate.

Books Recommended

1. Holechek, J. L., R.D. Piper and C.H. Herbel. 1989. Range Management; Principles and Prentice Hall Inc. Englewood, Cliffs NJ.
2. Morley, F.H. W. 1981. Grazing Animals. Elsevier Scientific Pub. Co., Amsterdam, The Netherlands.
3. Muhammad, N. 1989. Rangeland Management in Pakistan. Intl. Centre for Integrated Mountain Development, Kathmandu, Nepal.
4. Qureshi, M. A. A., G. S. Khan and M. S. Yaqoob. 1993. Range Management in Pakistan. Kazi Publications, Ganpat Road, Lahore.

LM-312 CAMEL AND EQUINE MANAGEMENT 4(3-2)

Theory

Importance of camel and equines; domestication; types and classes; camel as a milk, meat and draft animal; camel and horse as race animals; equines (horses, donkeys, mules) as draught animals; special characteristics of mule; body conformation of camel & horse; colours and markings; selection criteria for various types; management during various phases of life; reproduction in camel and horses; identification techniques; stable designing; fittings and equipment; different vices and their control; various gaits; principles of equitation; saddle and sore back; importance of shoes and care of feet; peculiarities of camel feet; important types of bits; breaking horses, mule and camels for riding, racing and draught purpose; welfare of camel and equines; transportation and marketing; common ailments; prophylactics and first aid.

Practical

Demonstration about body conformation, defects, various colours and markings; determining age by teeth; marking camel and horse; suitable plans for stable construction; grooming and cleaning; use of

various management tools and equipment; care of foot; use and care of harness and saddles; equitation practice; measuring physiological norms; visit to stud farms.

Books Recommended

1. Barly, M. 1981. Horse – A Practical and Scientific Approach. McGraw Hill Book Co., New York.
2. Manefield, G.W. and A.H. Tinson. 1997. Camels –A Compendium. Postgraduate Foundation, Sydney, NSW, 1235.
3. Kacker, R.N. and B.S. Panwar. 1996. Text Book of Equine Husbandry. Vikas Pub. Pvt. Ltd., New Delhi.
4. Frape, D. 1993. Equine: Nutrition and Feeding. Longman, UK.
5. Wilson, R. T. 1998. Camels. McMillan Education London.
6. Higgens, A. A. and I. A. Wrights. 1989. Equine Manual, Saunder,

LM-511 MANAGEMENT OF DAIRY ANIMALS 4(3-2)

Theory

Scope and importance of the dairy industry of Pakistan; characteristics of local, exotic and crossbred dairy animals; principles of profitable dairy production; buffalo and cow as major dairy animals; camel as a dairy animal; selection of dairy animals; establishing a dairy enterprise; raising dairy replacements; managing dairy animals for increased reproductive efficiency; management of sire, pregnant and lactating animals; significance of dry buffalo/cow therapy; thermal stress and buffalo/cow performance; feeding for economical milk production; an ideal udder; defects of udder; plans and specifications for dairy buildings and equipment; record keeping; dairy herd improvement associations; dairy system models; modern trends in dairy industry; buying and selling guide; prophylactic measures; common ailments.

Practical

Demonstration of characteristics of an ideal dairy animal; judging, selection and use of score cards; body condition scoring; weaning practices; care, handling and feeding of calves; milking practice (hand/machine milking); identification of dairy breeds; design and layout plans for dairy buildings; demonstration of dehorning/disbudding, castration, extra teat removal, teat dipping, hoof trimming, etc; dry cow/buffalo management; planning for year round fodder availability; fodder preservation practices; preparing feasibility reports; use of computer for record keeping; visit to dairy farms and shows.

Books Recommended

1. Ensminger, M.E. 1993. Dairy Cattle Science. The Interstate Printers, Danville, Illinois, USA.
2. Fahimuddin, M. 1989. Domestic Water Buffalo (2nd Ed.) Oxford and IBH. Pub.Co., Pvt. Ltd. New Delhi, India.
3. Schmidt, G.H., L.D. Van Vlek and M.F. Hutjens. 1988. Principles of Dairy Science (2nd Ed.). Prentice Hall Inc., Englewood Cliffs, New Jersey, USA.
4. Bath, D.L., F.N. Dickenson, H.A. Tucker and R.D. Appleman. 1985. Dairy Cattle: Principles, Practices, Problems, Profits. Lea & Febiger, Philadelphia.

LM-512 PRINCIPLES OF MILK PRODUCTION 4(3-2)

Theory

Classification of mammals; structure and development of mammary gland; blood and nerve supply to the udder; role of hormones in udder development; mammogenesis and lactogenesis; synthesis of milk; milk let down and its inhibition; factors affecting milk secretion and composition; biotechnology and enhanced milk production; hand and machine milking; physical and chemical properties of milk; hygienic milk production; collection, transportation, processing and marketing of milk; dairy products; milk ordinance; milk borne diseases.

Practical

Manual and machine milking practice; demonstration of milk let down; removal of residual milk; hygienic measures for clean milk production; mastitis screening tests; macro and micro structure of udder; physical and chemical analysis of milk; cleaning and sanitizing of barns and equipment; visit to milk processing plants.

Books Recommended

1. Davis, J.G. 1994. Milk Testing. Agro-Botanical Pub. India.
2. Ensminger, M.E. 1993. Dairy Cattle Science. The Interstate Printers, Danville, Illinois, USA.
3. Larson, B.L. 1985. Lactation. The Iowa State University Press, Iowa.
4. Schmidt, G.H., L.D. Van Vlek and M.F. Hutjens. 1988. Principles of Dairy Science. Prentice Hall Inc., Englewood Cliffs, New Jersey.

LM-513

FARM PRACTICE

2(0-4)

Practice of various management operations and tools; approaching, handling and restraining animals; identification of farm animals; grooming and cleaning; dehorning, castration, docking, drenching, dipping and spraying; shearing; use of strip-cup and other screening tests; milking practice; managing young and stud stock; fencing; maintaining farm records; judging animals and use of score card; detection of ailing animals and those in heat; protecting animals from inclement weather; feeding and watering routine; land and labour management; planning for year round feed and fodder supply; fodder preservation; housing plans and stable management.

LM-516

MANAGEMENT OF RANGE LIVESTOCK (For Forestry Major Class)

2(1-2)

Theory

Distribution of livestock in various range regions; peculiar features of range livestock management; systems of raising range livestock; grazing behaviour and grazing systems for different livestock species; use of crop aftermath by range livestock; common ailments and their prevention under range conditions.

Practical

Determining stocking rate and carrying capacity of range; range forage utilization and feeding management; preparation for breeding; shelters for range livestock; fencing; marketing of range livestock and their products.

Books Recommended

1. Qureshi, M.A.A., G.S. Khan and M.S. Yaqoob. 1993. Range Management in Pakistan. Kazi Publications, 121-Zulqurnain Chambers, Ganpat Road, Lahore.
2. Muhammad, N. 1989. Rangeland Management in Pakistan. Intl. Centre for Integrated Mountain Development, Kathmandu, Nepal.
3. Morley, F.H. W. 1981. Grazing Animals. Elsevier Scientific Pub. Co., Amsterdam, Netherlands.

LM-611 PRINCIPLES OF MEAT PRODUCTION 4(3-2)

Theory

Scope and importance of meat production in Pakistan; important meat and dual purpose breeds; meat terminology; systems of meat production; breeding, feeding and reproductive management; veal and dairy beef; off take rate; feed additives for enhanced growth and fattening; growth rate and fattening potential of cow, buffalo camel male calves and male sheep and goats; factors affecting carcass and meat quality; post-slaughter changes in carcass; carcass evaluation; cuts and meat grades; spoilage of meat; hygienic meat production; storage and preservation; buffalo, yak and camel as meat animals; meat system models; marketing; economics of meat production; meat by-products; modern slaughterhouses.

Practical

Body conformation of meat animals; ante-mortem examination; slaughtering and dressing percentage; carcass evaluation; judging meat animals; humane handling and animal welfare; slaughterhouse management; practical tips for housing and feeding of meat animals; handling of slaughterhouse by products; visits to slaughterhouses and feed lots; designing modern slaughterhouses; feasibility reports.

Books Recommended

1. Romans, J.R. and P.T. Ziegler. 1994. The Meat We Eat. The Interstate Printers and Publishers Inc., Danville, Illinois, USA.
2. Ensminger, M.E. 1993. Beef Cattle Science. The Interstate Printers, Danville, Illinois, USA.
3. Lawrie, R.A. 1991. Meat Science . Pergamon Press, Oxford. UK.
4. Hill, D. 1990. Cattle and Beef Production in the Tropics. ELBS. Longman, Singapore.

LM-612 INTERNSHIP IN LIVESTOCK MANAGEMENT 5(0-10)

The students in the last semester will be kept fully involved in the practical and applied aspects of livestock management in different livestock enterprises. The class will be divided into groups of convenient number and allotted to different activities by rotation. The university livestock experiment station will be one important station where each group will be given practical training under the guidance of faculty members. The other stations will include livestock farms, livestock experiment stations and livestock production research institutes, ranges, cattle feed mills, slaughterhouses, tanneries and milk processing plants. The students will be required to participate in the routine daily work at the respective station in order to develop the necessary skills and practical understanding. At the end of the semester separate report for each station will be required to be submitted by each student for evaluation by the respective teacher and counted towards the final grade.

POSTGRADUATE COURSES IN LIVESTOCK MANAGEMENT

<u>Course No.</u>	<u>Title</u>	<u>Credit Hours</u>
LM-701	Dairy Production	4(3-2)
LM-702	Milk Secretion and Lactation	4(3-2)
LM-703	Behaviour and Welfare of Domestic Animals	4(3-2)
LM-704	Livestock Industry	4(3-2)
LM-705	Livestock Production in Warm Climates	4(3-2)
LM-706	Range Livestock Production	3(2-2)
LM-707	Draught Animal Management	3(2-2)
LM-708	Advanced Meat Production	4(3-2)
LM-709	Advanced Sheep and Goat Production	4(3-2)
LM-710	Advanced Wool and Hair Science	4(3-2)
LM-711	Trends and Potential of Milk and Meat Production	4(3-2)
LM-712	Recent Advances in Livestock Management	3(3-0)
LM-719	Special Problem	1(0-2)
LM-720	Seminar	1(1-0)

LM-701

DAIRY PRODUCTION

4(3-2)

Theory

Brief history and development of dairying in the world and Pakistan; establishing a modern dairy enterprise; production performance; raising replacement; selection and culling guide; world famous dairy breeds; cow versus buffalo as dairy animal; management of exotic/crossbred animals; management during winter and summer; feeding and watering; farm records; improving breeding and reproductive efficiency; housing requirements; barn equipment; farm sanitation and waste management; fresh cow problems; common ailments in dairy animals, their prevention and control.

Practical

Dairy breed characteristics; selection on the basis of genotypic and phenotypic characteristics; design and layout of a modern dairy enterprise; practice of manual and machine milking adoption of hygienic measures at milking time; measurement of milk flow rate; least cost ration formulation using computer programmes; visits to dairy enterprises.

Books Recommended

1. Fields, M.H. and R.S. Sand. 1994. Factors Affecting Calf Crop. CRC Press Inc. Boca Raton, FL, USA.
2. Ensminger, M.E. 1993. Dairy Cattle Science. The Interstate Printers, Danville, Illinois, USA.
3. Van Horn, H.H. and C.J. Wilcox. 1992. Large Dairy Herd Management. American Dairy Sci. Assoc., Savoy, IL, USA.
4. Bath, D.L., F.N. Dickinson, H.A. Tucker and R.D. Appleman. 1985. Dairy Cattle: Principles, Practices, Problems, Profits. Lea and Febiger, Philadelphia, USA.

LM-702

MILK SECRETION AND LACTATION

4(3-2)

Theory

Evolution of mammary glands; macro and micro structure of udder; development of mammary gland; role of hormones in udder development; milk synthesis and secretion; factors affecting milk production and composition; physiology of milking, ejection and inhibition processes; mechanism of suckling; improper milking and its effect on production; role of hormones; hazards due to hormones, antibiotics, pesticides and radio active contamination of milk; lactation curve; nursing intensity; effect of pregnancy on lactation; role of hormones in maintenance of lactation; udder ailments.

Practical

Demonstration of an ideal udder; udder dissection; microscopic examination of mammary gland; demonstration of milk ejection reflex and milk let down; effect of oxytocin; analysis of residual milk; physical examination and determination of chemical composition of milk.

Books Recommended

1. Ensminger, M.E. 1993. Dairy Cattle Science. The Interstate Printers, Danville, Illinois, USA.
2. Larson, B.L. 1985. Lactation. The Iowa State University, Press, Ames, IA, USA.
3. Davis, J.G. 1994. Milk Testing. Agro-Botanical Pub. New Delhi, India.

LM-703

BEHAVIOUR AND WELFARE

4(3-2)

OF DOMESTIC ANIMALS

Theory

Introduction; scope and importance of animal behaviour; physiological basis of behaviour; environmental influence; impact of domestication on behaviour; evolution of behaviour; aggressive, feeding, learning, reproductive and communication behaviour; role of hormones and pheromones; selection for behavioural characteristics; age and living space in relation to behaviour; social organization and variations among social groups; comparative behaviour of cattle, buffaloes, sheep, goats, horses, camel and chicken; comparison between behaviour of wild and domestic animals; rights of animals; unnecessary beating/torturing animals; rest required during peak heat hours; protection from severe cold/heat; humane slaughter; adequate housing space; animal fight unethical; review of SPCA Act.

Practical

Assignments on behavioral observations on various species of animals; using general methods of behaviour analysis including natural, experimental and comparative methods.

Books Recommended

1. Fraser, A.F. 1990. Farm Animal Behaviour and Welfare. Bailliere Tindal and Cassell, London.
2. Drickamer. L.C. and H.V. Vessey, 1986. Animal Behaviour: Concepts, Processes, and Methods. Wadsworth Pub. Co., California, USA.
3. Hafez, E.S.E. 1975. The Behaviour of Domestic Animals. The Williams and Wilkins Company, Baltimore, USA.
4. Roleff, T. R. and J. A. Hurley. 1999. The Rights of Animals Green Heaven Press, San Diego, CA.

LM-704

LIVESTOCK INDUSTRY

4(3-2)

Theory

National strategies for livestock development; contribution of livestock and their products to the national economy; production of milk, meat and animal fibre; economical levels of production for optimum profitability; common features of livestock industries; integrated livestock production; cost analysis of various livestock products; marketing patterns for livestock and livestock products; production losses due to diseases; losses involved in marketing; case studies.

Practical

Exercises on patterns and trends of livestock production and case studies; visits to livestock farms; feed mills, wool test house, hides/skin markets, dairy plants, slaughterhouses, meat processing and leather processing factories.

Books Recommended

1. Issani, G.B. 1992. Marketing of Livestock and Their Products in Pakistan, Zeb Adabi Markaz, Hyderabad, Sindh.
2. Anonymous. 1987. FAO-ADB, Pakistan Livestock Sector Report. FAO, Rome.
3. Duane, A. 1978. Animal Science and Industry. Prentice Hall Inc., Englewood Cliffs, USA.
4. Payne, W. A. J. 1999. An Introduction to Animal Husbandry in the Topics, ELBS Longman, Singapore.

LM-705 LIVESTOCK PRODUCTION IN WARM CLIMATES 4(3-2)

Theory

Principles of adaptation; homeostasis; hormonal and physiological changes due to stress; factors influencing livestock production in cold and warm climates; study of production systems; physical environment; consequences of thermal stress on livestock; determining the suitability of livestock to varying climates; reproductive performance and animal health in warm climates; effect of diseases and parasites on productive and reproductive performance; handling of animal products in warm climates; developing livestock programmes suited to warm climate regions.

Practical

Observations and recording of climatic data including temperature, relative humidity, photoperiods and precipitation; using computer; demonstration of effects of weather on feed consumption, production and general activity; environmental influences on reproductive performance; observations on oestrus, ovulation time, time of service and fertility; shelters, space per animal, confined rearing; layout plans for farms in hot climates; visits to livestock farms located in different agro-ecological zones.

Books Recommended

1. Schmidt, 1997. Animal Physiology: Adaptation and Environment (4th Ed.) Cambridge, UK.
2. Curry, B.W. 1992. Structure and Function of Domestic Animals. CRC Press, Inc., Boca Raton, FL. USA.
3. Ensminger, M.E. 1991. Animal Science. The Interstate Printers, Danville, Illinois, USA.
4. Hafez, E.S.E. 1975. Adaptation of Farm Animals. Baillier Tindal and Cassell, London, U.K.

LM-706 RANGE LIVESTOCK PRODUCTION 3(2-2)

Theory

Range livestock industry; ecological problems and concepts; mechanisms of controlling animal population; native range forage plants; protection of land resources and range livestock; selection and handling of livestock on ranges; supplementary feeding on ranges; range inventories and grazing plans; range resources improvement and pasture development; conservation of water resources on ranges; ailments of range animals; carrying capacity and stocking rates.

Practical

Effect of supplementary feeding on the performance of grazing animals; seasonal variation in body condition; measurement of nutritional status through blood metabolites; observations on grazing habits of buffaloes, cattle, sheep, goats and camels; visits to range areas for observation on range inventory, fencing, rotational grazing, calculating carrying capacity and stocking rate of grazing animals;

Books Recommended

1. Qureshi, M.A.A., G.S. Khan and M.S. Yaqoob. 1993. Range Management in Pakistan. Kazi Publications, 121-Zulqurnain Chambers, Ganpat Road, Lahore.
2. Drickamer, L.C. and H.V. Vessey. 1986. Animal Behaviour: Concepts, Processes and Methods. Wadsworth Pub. Co., California, USA.
3. Morley, F.M. W. 1981. Grazing Animals. Elsevier Scientific Pub. Co., Amsterdam, The Netherlands.
4. Bell, H.M. 1978. Rangeland Management for Livestock Production. University of Oklahoma Press, USA.

5. Vallentine, J. F. 1989. Range Development and Improvement. (3rd Ed.) Academic Press, Inc. San Diego, CA.

LM-707 DRAUGHT ANIMAL MANAGEMENT 3(2-2)

Theory

Contribution of draught animals to agriculture and national economy; draught animal vs. mechanical power; types and breeds of draught animals; selection, housing, management and feeding during work and rest; work performance and energetics; comparative efficiency of draught animals; types of harnesses and equipments; ailments of draught animals, their welfare and prospects in Pakistan.

Practical

Breaking and training of draught animals; measuring draught power and efficiency; use of different types of harnesses; examination and certification of draught animals for soundness.

Books Recommended

1. Payne, W.A.J. 1999. An Introduction to Animal Husbandry in the Tropics. ELBS. Longman, Singapore.
2. Frape, D. 1993. Equine: Nutrition and Feeding. Longman, UK.
3. Hoffman, D., J. Nari and R.J. Petheram. 1989. Draught Animals in Rural Development. Proc. Int. Res. Symp., Cipanas, Indonesia. 3-7 July, 1989. ACIAR, Australia.
4. Wilson, R. T. 1998. Camels. McMillan Education London.

LM-708 ADVANCED MEAT PRODUCTION 4(3-2)

Theory

Meat production in Pakistan; meat and human nutrition; consumer preference for various meats; shortcomings and achievements; systems of raising meat animals; selection of stock for meat production; housing, feeding and management of meat animals; factors affecting their growth and development; structure and growth of muscle; slaughter house practices; modern abattoirs; slaughtering methods; grading and evaluation of carcass; spoilage of meat; storage and preservation of meat; transportation and marketing of meat animals and meat; slaughter house by-products; meat borne diseases.

Practical

Ante and postmortem examination; slaughtering and flaying methods; determination of dressing percentage; meat grades and carcass evaluation; meat cuts; determining important physical and chemical properties of various meats; organoleptic studies of meats; visits to slaughter houses.

Books Recommended

1. Romans, J.R. and P.T. Ziegler. 1994. The Meat We Eat. The Interstate Printers and Publishers Inc., Danville, Illinois, USA.
2. Lawrie, R.A. 1991. Meat Science. Pergamon Press, Oxford. UK.
3. Kempster, T., A. Dughbertson and G. Harrington. 1982. Carcass Evaluation in Livestock Breeding, Production and Marketing. Granada Publishing Co., UK.
4. Ensminger, M.E. 1993. Beef Cattle Science. Interstate Printers and Publishers Inc., Danville, Illinois.

LM-709 ADVANCED SHEEP AND GOAT PRODUCTION 4(3-2)

Theory

Domestication of sheep and goats, their economic importance; modern sheep and goat enterprise; various production systems; management practices; housing, feeding and breeding of sheep and goats; handling facilities for sheep and goats; flock management during inclement weather; ecological influences on sheep and goat production; marketing of sheep, goats and their products; recent developments in sheep and goat production; common ailments; economic analysis of sheep and goat farming.

Practical

Selection and judging of sheep and goats for wool, mutton and milk; farm practices including identification, culling, dipping, deworming, trimming feet;; farm visits; preparation of feasibility reports; computerized record keeping.

Books Recommended

1. Issani, G.B. and M.N. Baloch. 1996. Sheep and Goat Breeds of Pakistan. Press Corporation of Pakistan, Karachi, Pakistan.
2. Kaushish, S.K. 1994. Sheep Production in Tropics and Subtropics. Pak Book Corporation, Lahore, Pakistan.
3. Anonymous. 1992. Sheep Production Handbook. American Sheep Industry Association, Production, Education and Research Council. SID, Englewood, CA, USA.
4. Ensminger, M.E. and R. O. Parker. 1986. Sheep and Goat Science. Interstate Printers and Publishers Inc., Danville, Illinois, USA.

LM-710 ADVANCED WOOL AND HAIR SCIENCE 4(3-2)

Theory

Importance and utilization of wool and hair; annual production; microscopic structure of skin, wool & hair and their physico-chemical characteristics; histological development of hair; wool production and consumption; wool terms; properties of wool as a textile fiber; classification of fibers; animal fiber and synthetic fiber; mohair and Cashmere hair; growth and development of the medullated and non-medullated wool fibers; arrangement of follicles in the skin; gross composition of raw wool; effect of water, steam, heat, cold, sun light, acid, alkali and salt on wool; handling, grading and marketing of wool and hair; factors affecting their yield and quality; significance of Pakistani wool in carpet industry.

Practical

Wool and hair sampling; microscopic structure of animal fibers; measurements of fiber length and diameter; detection of extractable matter; histological studies of follicles and fiber; handling, sorting, scouring, grading, packing, labeling and storage of animal fiber; measurement of crimp, staple length, wool fat, suint and ash; visual grades of wool; visit to woolen mills and carpet industry and wool test house; visit to animal fiber markets.

RECOMMENDATIONS

1. Uniform curriculum should be followed for the same degree programme offered at different institutions.
2. The minimum duration of M. Sc. (Hons) degree programme, declared equivalent to M. Phil by U.G.C., should not be less than two years.
3. Funds for the purchase of latest books periodicals, overhead projectors and other A. V. Aids be provided to the institutions to facilitate implementation of the revised curriculum in true spirit.
4. Computers should be provided to the Livestock Management departments and internet facilities be made available to enable the students to develop practical skills in the use of computer packages. Movie camera should be provided to the concerned departments for preparation of videos in their own field at local level.
5. In-service training opportunities be provided in computer courses as well as professional subjects in the field of Livestock Management in order to improve the quality of teaching and research in the universities.
6. Funds for procurement of videos (local/foreign) and computer CDs in different animal science subjects including dairy farming, camels, horses, sheep and goats, milk processing, meat processing etc be provided for use as teaching aid.
7. Professional degree programmes in AH/V.Sciences particularly at postgraduate level offered by general universities should be made equivalent in all respects including the basic requirements of admission, curriculum and duration of the degree to be at par with professional universities in quantity quality of knowledge and training.
8. The committee recommends that due to rapid changes in the subject matter and professional know-how the curriculum may be revised and updated through NCRC after every four years. The changes proposed by the committee should be pursued in the universities for implementation.
9. Special funds should be allocated for the newly proposed internship programme which has been added to upgrade the professional skills of the graduates.
10. To encourage the committed and dedicated teachers, the institution of best teacher award in each discipline be effectively streamlined so that really deserving teachers on the basis of a uniform assessment criteria are nominated by the universities.