# SCHEME OF STUDIES

# FOR

# Ph.D. Livestock Management

**Department of Livestock Production and Management**

**Faculty of Veterinary and Animal Sciences**

**Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi**

# SCHEME OF STUDIES

## PhD in Livestock Management Courses

| Course Code | Courses | Credits Hours |
|---|---|---|
| LM-801 | Milk Secretion and Lactation | 3(2-2) |
| LM-802 | Animal Growth and Adaptation | 3(3-0) |
| LM-803 | Advances in Meat Production | 3(3-0) |
| LM-804 | Recent Advances in Livestock Management | 3(3-0) |
| LM-805 | Advanced Concepts in Livestock Production Systems | 2(2-0) |
| LM-820 | Seminar-I | 1(1-0) |
| LM-820 | Seminar-II | 1(1-0) |
| LM-899 | Thesis | 50(0-100) |

# SUMMARY

## LM-801 Milk Secretion and Lactation 3(2-2)

**Theory**

Evolution and development of mammary glands; udder anatomy; arterial, venous, lymphatic and nervous systems; physiology of milking; role of hormones in udder development; theories of milk synthesis, milk synthesis and secretion; managing cow lactation cycles; Farm economics and lactation, ejection and inhibition of milk; factors affecting clean milk production and composition; suckling mechanism, hand milking and machine milking; improper milking and its effect on production; hazards due to hormones, residual effects of antibiotics and pesticides; radioactive contamination of milk; nursing intensity; role of hormones in maintenance of lactation; common udder ailments and preventive measures, Mastitis and its effect on production and economics of dairy animals .

**Practical**

Demonstration of an ideal udder; demonstration of milk ejection reflex and milk let down; machine milking and its maintenance, CIP system and hygiene, udder dissection; microscopic examination of mammary gland; physico-chemical analysis of milk; total solids, solid not fat, Milk acidity and Protein, milk fat, milk lactose, Working of lacto-star, analysis for milk adulterants and residual milk, milk preservation and its effect of milk quality, milk qualitative analysis; COB, methylene blue reduction test, rezasurine test, somatic cell count, colony counting and micro organism in milk

**Books Recommended**


1. Hamdi, N., and R. Payan-Carreira. 2020. Lactation in Farm Animals: Biology, Physiological Basis, Nutritional Requirements, and Modelization. BoD–Books on Demand.
2. Akers, R. M. 2016. Lactation and the Mammary Gland. Blackwell Publishing Co., Ames, Iowa, USA.
3. Muhammad, K. 2015. Laboratory Manual: Quality Control of Milk. Create Space Independent Publishing Platform, Amazon, USA.
4. Frandson, R.D., W.L. Wilke and A.D. Fails. 2009. Anatomy and Physiology of Farm Animals (7th Ed.)Wiley-Blackwell, USA.
5. Larson, B.L. 1985. Lactation. The Iowa State University, Press, Ames, IA, USA.


## LM-802 Animal Growth and Adaptation 3(3-0)

**Theory:**

Basic concepts of growth, Stages of growth in animals, growth; factors governing the growth and development in dairy and meat animals; role of hormone in growth, tissues: Growth and Structure Relative to Product Value for Human Consumption, prenatal and postnatal growth concepts, concept of efficiency of growth, effective use of growth promoters, introduction to adaptation and mechanism; stress and adaptation; anatomical and morphological changes during adaptation; adaptation in different agro ecological zones; growth regulators and promoters; energetic; stress; hormonal and physiological changes due to stress; homeostasis; animal adaptation in climatic changes; behavioral adaptation; species specific adaptations; understanding stress and distress in livestock, metabolic consequences of stress, environmental effects on productive and reproductive performance.

**Books Recommended**


1. Lonergan, S.M., D.G. Topel, and D.N. Marple. 2019. The Science of Animal Growth and Meat Technology. Academic Pres
1. Veerasamy, S., J. Gaughan, L. Baumgard, C. Prasad. 2015. Climate Change Impact on Livestock: Adaptation and Mitigation. Springer (India) PVt. Lt.
2. Collier, R. J. and J. L. Collier. 2012. Environmental Physiology of Livestock. John Wiley & Sons, Inc. USA.
3. Frandson, R.D., W.L. Wilke and A.D. Fails. 2009. Anatomy and Physiology of Farm Animals (7th Ed.) Wiley-Blackwell, USA.
4. te Pas, M.F.W., M.E. Everts and H.P. Haagsman. 2004. Muscle Development of Livestock Animals: Physiology, Genetics And Meat Quality. CABI Publishing, Oxford shire OX10 8DE, UK.
5. Hafez, E.S.E. 1975. Adaptation of Farm Animals. Baillier Tindal and Cassell, London, UK.


## LM-803 Advances in Meat Production 3(3-0)

**Theory:**

Importance of meat in human nutrition, meat production in Pakistan and global scenario, Beef and mutton production systems (local and global); new trends in meat production and management, prefeasibility development of meat farm, housing, feeding and general health care of meat animals, factors affecting meat (animals) growth, structure and growth of muscle; Muscle Structure, Exercise and Metabolism, structure and growth of muscles, Chemical and biochemical constitution of muscle, conversion of muscle to meat, conversion of muscle to meat, managing meat quality, transportation and meat quality, commercial grading and evaluation of meat cuts, establishment of modern slaughter houses and butcheries, storage, post slaughtering care and transportation, development of livestock markets and role of private sector, slaughter house by- products and meat borne diseases, Spoilage and preservation of meat. Carcass fabrication guide and carcass measurements, determination of dressing percentage, meat grading and carcass evaluation, marbling and marbling score, eye muscle area, carcass maturity, myology and demonstration of various muscle types, carcass dissection, physical and chemical properties of meat, meat cooking loss, meat water holding capacity, meat drip loss, meat colour and meat texture analysis and sensory paneling

**Books Recommended**


1. Holloway, J.W., J. Wu. 2019. Red Meat Science and Production: Volume 1. The Consumer and Extrinsic Meat character. Springer Nature Pte Ltd and Science Press, China
2. Fairlie, S. 2011. A Benign Extravagance. Chelsa Green Publishers, USA.
3. Scollan, N., D. Moran and E.J. Kim.2010. The Environmental Impact of Meat Production Systems. Report to the International Meat Secretariat.
4. Warris, P.D. 2010. Meat Science - An Introductory Text .CAB International, UK.
5. Gregory, N.G. and T. Grandin. 2007. Animal Welfare and Meat Production. CAB International, UK.
6. Lawrie, R.A. and D.A. Ledward. 2006. Lawrie's meat science 7th Ed. Woodhead Publishing Limited and CRC Press LLC, USA.


## LM-804 Recent Advances in Livestock Management 3(3-0)

**Theory**

Comprehensive review of recent literature pertaining to important aspects of production; management of various species of farm animals; preparation of an extensive review paper on the assigned topics; research methods in livestock management; use of computers for retrieval of relevant information; recent advances in approach towards development and research in livestock production, new innovations related to feeding and management of farm animals; web surfing and digging related websites; case studies.

**Books Recommended**


1. Holloway, J. W., J. Wu. 2019. Red Meat Science and Production: Volume 1. The Consumer and Extrinsic Meat character. Springer Nature Pvt Ltd and Science Press, China
2. Cummins, E.J. 2016. Emerging Technologies in Meat Processing: Production, Processing and Technology. John Wiley & Sons Ltd. The Atrium, Southern Gate, Chichester, West Sussex, PO 198SQ, UK.
3. Swain, D.L. 2007. Redesigning Animal Agriculture: The Challenge of the 21st Century. CAB International, UK.
4. Owen, E., T. Smith, M.A. Steele, S. Anderson, A.J. Duncan, M. Herrero, J.D. Leaver, C.K. Reynolds, J.I. Richards and J.C. Ku-Vera. 2004. Responding To The Livestock Revolution: The Role of Globalization and Implications. Nottingham University Press, UK.
5. Younie, D. and J. M. Wilkinson. 2001. Organic Livestock Farming. Chalcombe Publications, USA.


## LM-805 Advanced Concepts in Livestock Production Systems 2(2-0)

**Theory**

History and development of production systems, world biomes, importance of livestock production system and its economic implications, world various types of production systems; Grassland-based systems, Mixed rain-fed systems, mixed irrigated systems, landless systems, Impact livestock production systems to rural livelihoods and poverty, Mapping global livestock production systems; Cattle production systems of Pakistan; Buffalo production systems of Pakistan, Small ruminant production systems of Pakistan, Camel production systems of Pakistan, Applications of global livestock production systems, future developments.

**Books Recommended**


1. Ilkka Leinonen · 2019. Environmentally Sustainable Livestock Production. MDPI. St Alban-Anlaga 66. Switzerland.
2. A.D, Herring. 2014. Beef Cattle Production Systems: CABI, Chuency Street, Boston, USA.
3. Robinson, T.P., Thornton P.K., Franceschini, G., Kruska, R.L., Chiozza, F., Notenbaert, A., Cecchi, G., Herrero, M., Epprecht, M., Fritz, S., You, L., Conchedda, G. & L.See. 2011. Global livestock production systems. Food and Agriculture Organization of the United Nations (FAO) and International Livestock Research Institute (ILRI), Rome, Italy.
4. N. Teufel, A. Markemann, B. Kaufmann, A. Valle Zarate and J. Otte. 2010. Livestock Production Systems in South Asia and the Greater Mekong Sub-Region: A Quantitative Description of Livestock Production in Bangladesh, Cambodia, India, Lao PDR, Nepal, Pakistan, Sri Lanka, Thailand, and Viet Nam. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy.

5. A. Rosati, A. Tewolde, C. Mosconi. 2003. WAAP Book of the year 2003: A review of Livestock Systems Developments and and Researches. Wageningen Academic Publishers, Netherlands.

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| **LM-820** | **Seminar-I** | **1(1-0)** |
| **LM-820** | **Seminar-II** | **1(1-0)** |
| **LM-899** | **Thesis** | **50(0-100)** |