

Doctor of Philosophy Program in Animal Science

(International Program – New Curriculum 2002)

1. Title of Curriculum

Doctor of Philosophy Program in Animal Science

2. Names of Degree

2.1 Doctor of Philosophy (Animal Physiology)

Ph.D (Animal Physiology)

2.2 Doctor of Philosophy (Ruminant Nutrition)

Ph.D (Ruminant Nutrition)

2.3 Doctor of Philosophy (Nonruminant Nutrition)

Ph.D (Non-ruminant Nutrition)

2.4 Doctor of Philosophy (Animal Genetics and Breeding)

Ph.D (Animal Genetics and Breeding)

2.5 Doctor of Philosophy (Forage Crops and Pasture Management)

Ph.D (Forage Crops and Pasture Management)

3. Objectives of the Curriculum

The Doctor of Philosophy Programs in Animal Science aims to produce Ph.D graduates who have the following capabilities and quality:

3.1 Having sufficient knowledge and technological mechanisms for conducting in-depth research in their academic and related areas to generate novel technology and knowledge that can be used in developing the better, more efficient and sustainable animal production systems which least adversely affect the sustaining balances of natural resources and environment;

3.2 Having ability to diagnose and analyze animal production problems, to research aiming at solving those problems under a variety of existing production constraints, and to efficiently transfer the technology that all levels of end-users can practically apply in their production systems;

3.3 Having sufficient ability to communicate in English and sufficient leadership being able to interact, lead and/or participate in any academic activities or professional community at both national and international levels;

3.4 Being initiative and having scientific minded, with high responsibility and respectable professional ethics.

4. Curriculum

The doctorate degree program in Animal Science is research oriented emphasizing research work that will generate new knowledge and has high academic quality in the specialized areas. The program comprises of 5 specialized disciplines : Animal Physiology; Ruminant Nutrition; Non-ruminant Nutrition; Animal Genetics and Breeding; and Forage crops and Pasture Management. Each specialized discipline offers 2 study plans : Plan 1 and Plan 2. Each plan admits students with either a Bachelor of Science degree or a Master of Science degree.

4.1 Study Plans

Plan 1 emphasizes research dissertation that will generate new knowledge and has high academic quality in Animal Science.

(1) Candidates with bachelor degree or equivalent are required to complete a minimum of 72 credits for thesis work and to take the following non-credit courses: 117 891 Animal Science Seminar I; 117 892 Animal Science Seminar II; 117 991 Animal Science Seminar IV; 117 992 Animal Science Seminar V; 117 993 Animal Science Seminar VI; and any other non-credit courses or course auditions as recommended by the thesis advisory committee.

(2) Candidates with master degree or equivalent are required to complete a minimum of 48 credits for thesis work and to take the following non-credit courses: 117 991 Animal Science Seminar IV; 117 992 Animal Science Seminar V; 117 993 Animal Science Seminar VI; and other non-credit courses or course auditions as recommended by the thesis advisory committee.

Plan 2 requires students to take both course work and dissertation research that will generate new knowledge and has high academic quality in the specialized area.

(1) Candidates with bachelor degree or equivalent are required to complete a minimum of 48 credits for thesis work and with a minimum of 24 credits for course work, totalling of 72 credits.

(2) Candidates with master degree or equivalent are required to complete a minimum of 36 credits for thesis work and with a minimum of 12 credits for course work, totalling of 48 credits.

4.2 Other requirement for the of the completion doctorate degree

To fulfill the requirements for the Doctor of Philosophy degree, complying with the Regulations of Khon Kaen University on Graduate Education Level, A.D. 2001, Section 9, Article 50, Items 50.3.3 and 50.3.4, the followings are to be satisfied:

4.2.1 Pass the English language examination as in accordance with the standard set by the program administrative committee and graduate school;

4.2.2 Pass the qualifying examination;

4.2.3 Pass the thesis examination and the thesis must be published or at least has been accepted to be published in a recognized journal or in academic printed matter which is well accepted in the field of Animal

Science, or must be orally presented in an international academic conference. Journal publication or research report presentation in any academic forum for those candidates who receive grants will be allowed in accordance with the regulation of the funding organization.

Number of the required published or presented research papers are:

Minimum of 3 papers for Plan 1 (1)

Minimum of 2 papers for Plan 1 (2) and Plan 2 (1)

Minimum of 1 paper for Plan 2 (2)

4.3 Program Structure for Ph.D. Degree in Animal Science

Plan 1

- (1) For candidates with Bachelor degree or equivalent

Course work Non-credit required courses as deemed appropriate

Thesis	A minimum of	72	credits
--------	--------------	----	---------

Total	A minimum of	72	credits
-------	--------------	----	---------

- (2) For candidates with Master degree or equivalent

Course work Non-credit required courses as deemed appropriate

Thesis	A minimum of	48	credits
--------	--------------	----	---------

Total	A minimum of	48	credits
-------	--------------	----	---------

Plan 2

- (1) For candidates with Bachelor degree or equivalent

Course work	A minimum of	24	credits
-------------	--------------	----	---------

- Required	A minimum of	3	credits
------------	--------------	---	---------

- Elective	A minimum of	21	credits
------------	--------------	----	---------

Thesis	A minimum of	48	credits
--------	--------------	----	---------

Total	A minimum of	72	credits
-------	--------------	----	---------

- (2) For candidates with Master degree or equivalent

Course work	A minimum of	12	credits
-------------	--------------	----	---------

- Required	A minimum of	3	credits
------------	--------------	---	---------

- Elective	A minimum of	9	credits
------------	--------------	---	---------

Thesis	A minimum of	36	credits
--------	--------------	----	---------

Total	A minimum of	48	credits
-------	--------------	----	---------

5. Program contents

5.1 Plan 1

- (1) For candidates with Bachelor degree or equivalent

The minimum required 72 credits of the program comprise of :

Required courses : The following courses and others as recommended by the thesis advisory committee are required as non-credit :

117 891	Animal Science Seminar I	1(1-0-3)
117 892	Animal Science Seminar II	1(1-0-3)
117 991	Animal Science Seminar IV	1(1-0-3)
117 992	Animal Science Seminar V	1(1-0-3)
117 993	Animal Science Seminar VI	1(1-0-3)

Thesis

117 996	Thesis	72	credits
---------	--------	----	---------

Total		72	credits
--------------	--	----	---------

- (2) For candidates with Master degree or equivalent

Required courses : The following courses and others as recommended by the thesis advisory committee are required as non-credit :

117 991	Animal Science Seminar IV	1(1-0-3)
117 992	Animal Science Seminar V	1(1-0-3)
117 993	Animal Science Seminar VI	1(1-0-3)

Thesis

117 996	Thesis	48	credits
---------	--------	----	---------

Total		48	credits
--------------	--	----	---------

5.2 Plan 2

- (1) For candidates with Bachelor degree or equivalent

The minimum required 72 credits of the program comprise of a minimum of 24 credits for course work and a minimum of 48 credits for thesis work

Course work	A minimum	24	credits
Required courses	A total of	3	credits
117 991	Animal Science Seminar IV	1(1-0-3)	
117 992	Animal Science Seminar V	1(1-0-3)	
117 993	Animal Science Seminar VI	1(1-0-3)	
Elective	A minimum of	21	credits

Candidates in each specialized discipline of the Ph.D. degree in Animal Science are required to select a minimum of 12 credits from elective courses in List A and the rests from List B or any other courses which the thesis advisory committee and the Program Administrative committee of Faculty of Agriculture allows to be used as the Program's elective courses making a total of at least 21 credits

Specilization in Animal Physiology

List A

117 731	Endocrinology of Domestic Animals	3(3-0-3)
117 732	Environmental Physiology of Domestic Animals	3(3-0-3)
117 733	Digestive Physiology	3(3-0-3)
117 735	Advanced Reproductive Physiology	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)

List B

117 722	Biotechnology for Reproduction in Domestic Animals	3(2-3-3)
117 734	Physiology of Growth	3(3-0-3)
117 736	Physiology of Lactation	3(3-0-3)
117 760	General Veterinary Medicine	3(3-0-3)
117 780	Research Methods in Animal Science	3(2-3-3)
117 782	Computer Application for Livestock Production	3(3-0-6)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Ruminant Nutritional Science

List A

117 748	Applied Biochemistry in Nutritional Science	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 841	Advanced Ruminant Nutritional Science I	3(3-0-3)
117 842	Advanced Ruminant Nutritional Science II	3(3-0-3)
117 843	Ruminant Nutritional Science Modeling	3(3-0-3)

List B

117 740	Tropical Feed Resources and Feeding Technology	3(3-0-3)
117 744	Protein and Amino Acid Nutritional Science	3(3-0-3)
117 745	Energy Nutritional Science	3(3-0-3)
117 746	Mineral Nutritional Science	3(3-0-3)

117 747	Vitamin Nutritional Science	3(3-0-3)
117 780	Research Methods in Animal Science	3(2-3-3)
117 782	Computer Application for Livestock Production	3(3-0-6)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 840	Antinutritive Substances in Feeds and Forages	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Non-ruminant Nutritional Science

List A

117 748	Applied Biochemistry in Nutritional Science	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 845	Quality Control and Feed Microscopy	3(1-6-2)
117 846	Advanced Non-ruminant Nutritional Science I	3(3-0-3)
117 847	Advanced Non-ruminant Nutritional Science II	3(3-0-3)

List B

117 700	Integrated Animal Production in Farming Systems	3(2-3-3)
117 715	Products from Tropical Animals	3(2-3-3)
117 740	Tropical Feed Resources and Feeding Technology	3(3-0-3)
117 742	Non-ruminant Nutritional Science	3(3-0-3)
117 744	Protein and Amino Acid Nutritional Science	3(3-0-3)
117 745	Energy Nutritional Science	3(3-0-3)
117 746	Mineral Nutritional Science	3(3-0-3)
117 747	Vitamin Nutritional Science	3(3-0-3)
117 749	Feed Manufacturing Technology	3(2-3-3)
117 760	General Veterinary Medicine	3(3-0-3)
117 780	Research Methods in Animal Science	3(2-3-3)
117 782	Computer Application for Livestock Production	3(3-0-6)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 840	Antinutritive Substances in Feeds and Forages	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Animal Genetics and Breeding

List A

117 751	Population Genetics	3(3-0-3)
---------	---------------------	----------

117 752	Biometrical Genetics	3(3-0-3)
117 753	Advanced Animal Breeding	3(3-0-3)
117 754	Biotechnology in Animal Breeding	3(2-3-3)
117 755	Animal Breeding Plans	3(3-0-3)
117 851	Genetic Estimation Theory in Animal Breeding	3(3-0-3)

List B

117 780	Research Methods in Animal Science	3(2-3-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 782	Computer Application for Livestock Production	3(3-0-6)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 852	Linear Models in Animal Breeding	3(3-0-3)
117 853	Animal Breeding Simulation	3(2-3-3)
117 854	Statistical Genomics	3(3-0-3)
117 856	Data Processing in Animal Breeding	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Forage Crops and Pasture Management

List A

117 771	Advanced Tropical Pasture	3(3-0-3)
117 772	Advanced Forage Crops Preservation	3(2-3-3)
117 773	Techniques in Forage Crops Research	3(2-3-3)
117 774	Forage Crops and Livestock Production in the Tropics	3(3-0-3)

List B

112 711	Advanced Soil Fertility	3(2-3-3)
117 780	Research Methods in Animal Science	3(2-3-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 782	Computer Application for Livestock Production	3(3-0-6)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Thesis	A minimum of	48	credits
117 998	Thesis	48	credits

(2) For candidates with Master degree or equivalent

The minimum required 48 credits of the program comprise of a minimum of 12 credits of course work and a minimum of 36 credits for thesis work

Course work	A minimum of	12	credits
Required courses	A total of	3	credits
117 991	Animal Science Seminar IV		1(1-0-3)
117 992	Animal Science Seminar V		1(1-0-3)
117 993	Animal Science Seminar VI		1(1-0-3)
Electives	A minimum of	9	credits

Candidates in each specialized discipline of the Ph.D. degree in Animal Science are required to select a minimum of 9 credits of the following elective courses or any other courses which the thesis advisory committee and the Program Administrative Committee allows to be used as the Program's elective courses making a total of at least 9 credits

Specialization in Animal Physiology

117 722	Biotechnology for Reproduction in Domestic	3(2-3-3)
117 732	Environmental Physiology of Domestic Animal	3(3-0-3)
117 734	Physiology of Growth	3(3-0-3)
117 736	Physiology of Lactation	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Ruminant Nutritional Science

117 740	Tropical Feed Resources and Feeding Technology	3(3-0-3)
117 744	Protein and Amino Acid Nutritional Science	3(3-0-3)
117 745	Energy Nutritional Science	3(3-0-3)
117 746	Mineral Nutritional Science	3(3-0-3)
117 747	Vitamin Nutritional Science	3(3-0-3)
117 748	Applied Biochemistry in Nutritional Science	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 840	Antinutritive Substances in Feeds and Forages	3(3-0-3)
117 841	Advanced Ruminant Nutritional Science I	3(3-0-3)

117 842	Advanced Ruminant Nutritional Science II	3(3-0-3)
117 843	Ruminant Nutritional Science Modeling	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Non-Ruminant Nutritional Science

117 715	Products from Tropical Animals	3(2-3-3)
117 740	Tropical Feed Resources and Feeding Technology	3(3-0-3)
117 744	Protein and Amino Acid Nutritional Science	3(3-0-3)
117 745	Energy Nutritional Science	3(3-0-3)
117 746	Mineral Nutritional Science	3(3-0-3)
117 747	Vitamin Nutritional Science	3(3-0-3)
117 748	Applied Biochemistry in Nutritional Science	3(3-0-3)
117 749	Feed Manufacturing Technology	3(2-3-3)
117 780	Research Methods in Animal Science	3(2-3-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 840	Antinutritive Substances in Feeds and Forages	3(3-0-3)
117 845	Quality Control and Feed Microscopy	3(1-6-2)
117 846	Advanced Non-ruminant Nutritional Science I	3(3-0-3)
117 847	Advanced Non-ruminant Nutritional Science II	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Animal Genetics and Breeding

117 752	Biometrical Genetics	3(3-0-3)
117 753	Advanced Animal Breeding	3(3-0-3)
117 754	Biotechnology in Animal Breeding	3(2-3-3)
117 755	Animal Breeding Plans	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 851	Genetic Estimation Theory in Animal Breeding	3(3-0-3)
117 852	Linear Model in Animal Breeding	3(3-0-3)
117 853	Animal Breeding Simulation	3(2-3-3)
117 854	Statistical Genomics	3(3-0-3)
117 856	Data Processing in Animal Breeding	3(3-0-3)
117 994	Special Problems	3(0-9-0)

Specialization in Forage Crops and Pasture Management

112 711	Advanced Soil Fertility	3(2-3-3)
117 772	Advanced Forage Crops Preservation	3(2-3-3)
117 773	Techniques in Forage Crops Research	3(2-3-3)
117 774	Forage Crops and Livestock Production in the Tropics	3(3-0-3)
117 781	Animal Science Research Techniques	3(3-0-3)
117 790	Selected Topics in Animal Science	3(3-0-3)
117 994	Special Problems	3(0-9-0)
Thesis	A minimum of	36 credits
117 999	Thesis	36 credits

6. Suggested time table of the study plans

Course No.	Course Name	Plan 1 (1) Credits	Plan 1 (2) Credits	Plan 2 (1) Credits	Plan 2 (2) Credits
First Year, 1st Semester					
117 xxx	Required course	(1)	(1)	1	1
117 xxx	Elective	-	-	6	6
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	-	-
117 999	Thesis	-	-	-	-
	Total	9+(1)	8+(1)	7	7
First Year, 2nd Semester					
117 xxx	Required course	(1)	(1)	1	1
117 xxx	Elective	-	-	3	3
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	6	-
117 999	Thesis	-	-	-	6
	Total	9+(1)	8+(1)	10	10

Second Year, 1st Semester

117 xxx	Required course	(1)	(1)	1	1
117 991	Elective	-	-	3	-
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	6	-
117 999	Thesis	-	-	-	8
	Total	9+(1)	8+(1)	10	9

Second Year, 2nd Semester

117 xxx	Elective	(1)	-	3	-
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	7	-
117 999	Thesis	-	-	-	8
	Total	9+(1)	8	10	8

Third Year, 1st Semester

117 xxx	Required course	(1)	-	3	-
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	7	-
117 999	Thesis	-	-	-	8
	Total	9+(1)	8	10	8

Third Year, 2nd Semester

117 xxx	Required course	-	-	3	-
117 996	Thesis	9	-	-	-
117 997	Thesis	-	8	-	-
117 998	Thesis	-	-	7	-
117 999	Thesis	-	-	-	6
	Total	9	8	10	6

Fourth Year, 1st Semester

117 996	Thesis	9	-	-	-
117 998	Thesis	-	-	8	-
	Total	9	-	8	-

Fourth Year, 2nd Semester

117 996	Thesis	9	-	-	-
117 998	Thesis	-	-	7	-
	Total	9	-	7	-
	Program Total	72	48	72	48

Note Figures in the parenthesis designate the required non-credit courses