Universitat Autònoma de Barcelona

2023/2024

Animal Production and Handling

Code: 103540
ECTS Credits: 6

Degree	Type	Year	Semester
2502445 Veterinary Medicine	OB	1	A

Contact

Name: Ramon Casals Costa

Email: ramon.casals@uab.cat

Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Teachers

Ana Cristina Barroeta Lajusticia

Josep Gasa Gaso

Maria Jose Milan Sendra

Maria Teresa Paramio Nieto

Josepa Plaixats Boixadera

Maria dels Dolors Izquierdo Tugas

Jordi Bartolomé Filella

Sergio Calsamiglia Blancafort

Susana Maria Martin Orue

Araceli Gort Esteve

Marta Amat Grau

Ricard Pares Casanova

Lorena Castillejos Velázquez

Ahmed Salama Fadali

Carmen Loreto Manuelian Fuste

Prerequisites

Being a first-year course no prerequisites are required. However, it is recommended that students revise their knowledge of animal Biology and Zoology.

Objectives and Contextualisation

This is a first-year class subject, basic type, where the main objective is to introduce students to the world of animal production and management, studying the basic food production systems of animal origin, and the main factors (biological, economic, social, environmental, etc.) that condition the profitability of companies in each productive sector.

In this subject, the term "animal management" is understood not as the manipulation of the individual animal (that is object of "Propedéutica") but as the handling of groups of animals, that is to say, the study of the principles in which the maintenance and breeding of animal collectivities, both production and company, is based.

Knowledge of these principles is essencial to understand animal production and different aspects related to the breeding and health of pet animals. In addition, one must take into account that a very high percentage of the students of our school have never had contact with livestock production and do not consider livestock as one of the most important professional options. In order to contribute to change this perception, the fact that first-time students have an opportunity to visit livestock farms and better understand the basis of animal production can be very important.

Therefore, it is a subject that integrates different knowledge, in order to explain the systems of animal production, according to species, in the context of a changing world, where economic circumstances and environmental factors increasingly condition the production of food of animal origin.

On the other hand, it should be indicated that this subject includes activities carried out in English, identified in This Teaching Guide as DA (Cat), DI (Spa) or ET (Teaching in English).

Among the objectives of the subject we highlight the following:

1. Understand and use productive terminology correctly.

2. Understand the relative importance of the different productive sectors and the factors that determine them.

3. Understand the operation of the main production systems of domestic species, integrating the physiological knowledge with economics.

4. Evaluate technical and / or economic indexes and know the competitiveness factors that condition profitability and sustainability of livestock farms.

5. Understand the general principles on which the maintenance and breeding of domestic animals is based.

6. Know the basics of livestock activity and understand that this activity is an important professional opportunity for veterinarians.

Competences

- Analyse, synthesise and resolve problems and make decisions.
- Demonstrate knowledge and understanding of structural and functional disorders of the animal organism.
- Demonstrate knowledge and understanding of the aspects of organisation, finance and management in all fields of the veterinary profession.
- Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
- Handle the correct protocols and technologies used to modify and optimise different animal production systems.
- Treat and handle animals in a safe and humanitarian manner, and instruct other people to properly employ these techniques.

Learning Outcomes

1. Analyse, synthesise and resolve problems and make decisions.
2. Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
3. Describe the historical evolution of the livestock intensification process and its consequences.
4. Handle groups of animals avoiding, or minimising, possible risks.
5. Identify and evaluate the factors that affect the production of products of animal origin.
6. Identify the different stages of livestock production cycles.
7. Identify the production systems of different domestic species, integrating physiological and economic knowledge.
8. Locate and identify the main producers of foodstuffs of animal origin, as well as their economic dimension.
9. Recognise and apply the basic standards for the general handling, feeding and reproduction of animal groups.

Content

THEORETICAL PROGRAM OF THE ASSIGNATURE

PRODUCTION SYSTEMS: Basic ideas

1.- Animal Production Systems (2h):

The animal production as an economic process of transformation. Bases of an animal production system. Main factors of production. Classification of animal production systems: extensive and intensive; conventional and ecological. Main advantages and disadvantages. Intensification of livestock production: causes and consequences. Ecological production: a complex alternative. Towards a more sustainable production.

CATTLE PRODUCTION

2.- Production of dairy cattle (2h):

Situation of the sector and structure of the productive system. Evolution of the production and consumption of dairy products. Marketing problems of milk.

Factors that condition milk production: extensive or intensive systems. Biological cycle of the cow and reproductive objectives. Management around calving. Importance of colostrum. Breeding, weaning and growth of replacement calves. Productive life: lactation curve and milk quality. Standardization of production. Examples of feeds and facilities. Economic viability of farms.

3.- Beef cows (1h):

Conditioning factors and productive alternatives. Relationship between grass availability and beef growth. Reproductive and feeding management according to the evolution of pastures and animals requirements. Management and feeding in critical periods. Basic facilities. Control of results.

4.-Calves fattening (1h):

The meat beef sector and the structure of the production system. Production cycle in intensive systems: production of pink or baby-beef. Growth curve, concepts in feeding, and evolution of feed consumption. Adaptation of management and facilities to reduce pathologies. Economics and marketing of beef. Production with more extensive and / or alternative systems.

SHEEP AND GOAT PRODUCTION

5.- Sheep and goat sectors (1h):

Importance of sheep and goat sectors worldwide, in Europe, Spain and Catalonia. Biological cycle of sheep and goats.

Objectives, production cycle and planning of herds producing meat. Birth, rearing and artificial lactation of lambs. Lamb fattening systems according to slaughter weight (light, heavy) and type of feeding (extensive, intensive, etc.). Basic housing systems. Production costs and competitiveness factors.

6.- Dairy sheep production systems (1h):

Objectives, productive cycle and planning of dairy sheep flocks. Type of weaning, lactation curves and productivity. Traditional and intensive type systems. Production costs and competitiveness factors.

7.- Goat production systems (1h):

Objectives, production cycle and herd planning. Lactation curve and stages of productive life. Milk production systems. Breeding and fattening systems for kids. Production costs and competitiveness factors.

SWINE PRODUCTION

8.- Pig production systems (2 h):

Introduction and objectives. Pig rearing systems: "white" and "Iberian" pigs. Key issues: 1) health status and 2) productive/reproductive cycle. Ovarian cycle and the mating objective. Managing the replacement gilts

9.- Planning pig farms (2 h):

Introduction. Main management guidelines: weekly and "non-weekly" batches. Organizing the sow's farm. Measuring and distributing pigs in the farm.

POULTRY PRODUCTION

10.- Poultry farming. Sectors of meat and laying hens (1h):

Evolution of the sectors and international trade (census, ...). Structure of the meat and poultry industry in Catalonia, Spain and Europe. Competitiveness factors of the poultry sector.

11.- Poultry production systems (1) (1h):

Breeders

Production of chicken meat in intensive systems. Optimization factors (index of the descriptive manual).

12.- Poultry production systems (2) (1h):

Intensive egg production.

Other poultry productions: extensive, ecological, capons, turkeys and alternative species. Aspects of bio security. Optimization factors (index of the descriptive manual).

PRACTICAL SESSIONS

A) PRACTICAL SESSIONS in Bases of Animal Production (identified as BPi)

1.- Production of dairy cattle - Virtual Farm (Teaching in English) (BP1 Practice)

Students will be using a web based computer simulation software. This program is very simple and automatically generates a dairy farm for each student. Students are required to take daily actions in a dairy farm, from feeding to insemination, from drying to culling animals or feeding. The results of these actions are

used to grade students performance based on an algorithm that automatically calculates the grade and provides feedback to students. The aim is to introduce students to the general dairy farm management tasks. (2 hours, in computer room)

It requires 10 additional hours of work at home.

2. The pig sector (BP2 Practice)

Pig rearing sector and meat production. SWOT analysis: Strength, Weaknesses, Treats and Opportunities.

3. Poultry production (BP3 Practice)

Calculation of the design and organization of a layer farm (organization, dimensioning or number of places, production, productivity, etc.) and another for broilers. Video of the sector: production halls,etc. The objective is to introduce the student to the management of a livestock industry. (2 hours, in video classroom).

4. Pigs Virtual farm (BP4 Practice)

It is done using a computer program, based on a Web environment that students can access. This program automatically generates a pig farm, and requires the student to make decisions about management measures to implement daily or weekly. It will be necessary to maintain the farm in the best possible balance and optimize productivity. The objective is to introduce the student to the management of farm tasks. (2 hours, in computer room).

It will require the review of the program a minimum of 15-25 consecutive days. The estimated dedication will be about 10 hours of work at home (between 15 and 30 minutes a day), but it can be modified upwards if there is more time available.

B) SEMINARS of Bases of Animal Production (identified as SBPi)

1. Quality and Food Sobereignty (SBP1 Seminar)

Introduction to the importance of food quality, safety and sobereignty. Basic factors to be considered (1 hour, in the classroom)

2. Value chain of agri-food products (Seminar SBP2)

Study of the chain of commercialization of agri-food products from the point of view of the economy (1.5 hours, in the classroom)

3. Common Agricultural Policy (CAP) (SBP3 Seminar)

Introduction to the CAP or Common Agricultural Policy (1 hour, in the classroom)

4. Discussion on Dairy cattle production: (SBP4 Seminar)

Discuss and evaluate the results, including those obtained in thecomputer program of the virtual farm of cows and the analysis-proposals made from the theory classes (which is basedonthe same farm) (1 hour, in the classroom)

5. Discussion on the pig virtual farm (SBP5 Seminar)

Discuss and evaluate the results obtained with the pig virtual farm program (2 hours, in the classroom)

C) ANIMAL HANDLING PRACTICES (Identified as MA ...)

The part of animal handling is basically practical, except some seminars. Animal management practices will be carried out in the UAB Farms and Experimental Field Service (dogs, poultry, small ruminants, crops and rabbits) and in commercial farms or external equestrian activities (cows, pigs and horses), except for one poultry practice (MAA3) that will be in the classroom and one in agronomy (MAAG5) that will be in the computer room. There will also be dog management seminars (SMAG1 and SMAG2), in addition to the

corresponding practice (MAG1). In all cases, the practices will aim to manage groups of animals and not the management of the animals considered individually. In addition, in the case of the practices of cattle, pigs, small ruminants and poultry, the phases of the productive cycle of these species will be described.

The planned practices are as follows (the code used in the academic calendar is indicated):

1. Dog management (MAG1), SGCE UAB (3h./practice), and dog management seminars (SMAG1 and SMAG2), in the classroom, 1.5 h / seminar.

2. Management of dairy cows (MAV), cow farms of the Girona area, (8 h./practice).

3. Management of small ruminants (MAR1 and MAR2), SGCE UAB (3 h./practice)

4. Poultry management (MAA1, MAA2 and MAA3), SGCE UAB, except MAA3 in the classroom, (1.5 h./practice, except MAA3, 2 h/practice)

5. Management of swine (MAP), Swine farm to be determined (4 h./practice)

6. Agricultural management-grazing (MAAG1, MAAG2,MAAG3, MAAG4, SGCE UAB (1 h./practice), and MAAG5, in the computer classroom (2h./practice).

7. Horse management (MACV1, Hípica el Grèbol, Moià, 2.5 h./practice; and MACV2 in the "Unitat Muntada de la Guàrdia Urbana" of Barcelone, 1.5 h./practice).

8. Rabbit management (MAC1, 2 h./practice; and MAC2 i MAC3, 1.5 h / practice), SGCE UAB.

Methodology

Teaching methodology and training activities (*)

The main teaching methodology will be face-to-face.

The center of the learning process is the student's work. The student learns by working, being the teacher's mission to help in this task by providing information or showing the sources where they can get and directing their steps so that the learning process can be carried out effectively. In accordance with these ideas and the objectives of the subject, the development of the course is based on the following activities:

Bases of Animal Production

1. Theory classes:

Theory classes will be face-to-face- and/or accessible via streaming. Teachers will leave different materials on the Virtual Campus (eg Power Point presentations, videoconferences, videos of master classes, etc.) and students will complet their learning with the personal study of the topics explained.

The student acquires the knowledge of the subject by attending master classes and with personal study. The lectures are conceived as a fundamentally unidirectional method of transmitting knowledge from teacher to student.

2. Practices:

There will be 4 practices for exploring to the most important production systems, and each of them will be used to raise awareness of a specific concept of Animal Production. Depending on the purpose, they will be held in theclassroom, in the computer classroom, or on line. In some of these practices students will be entrusted with self-learning work that they must complete and present, and which will be discussed later in a Seminar.

3. Seminars:

The seminars are sessions with a double purpose. On the one hand to work on knowledge that has not been exposed in depth in the lectures to completetheir understanding, and another to discuss the results obtained in the work entrusted in the practices.

4. Poster:

At the beginning of the course students will be asked to make a poster about a topic that they should choose among those proposed. The poster will be done in a group (minimum 2, maximum 3 people), and will deal with a topic or production system not explained in the rest of the subject, and will be evaluated at the end of the course by the tutor of each poster.

5. Animal Management /handling

This part of the subject will be practical and, if possible, will be carried out in livestock farms (the Farm and Experimental Field Service (SGiCE) of the UAB in the case of poultry, rabbits and small ruminants, and external farms in the case of cows and pigs), in the SGiCE kennel, in the case of dogs, and in an external equestrian, in the case of horses.

The practices will be carried out in small groups of students accompanied by a teacher. At the beginning of the course, students will have a series of guides and / or practice scripts on the Virtual Campus, which in some cases will be common to this and other subjects, such as eg. "Animal Ethology and Ethology". Each script will correspond to a species (eg. dogs, pigs, cows, small ruminants, birds, rabbits, horses).

The script will include concepts that the student must work during the practice. When it is considered convenient, a final questionnaire will be included that the student will have to answer and deliver in writing once the practice or group of practices of each species is finished, and which will be assessable by the corresponding professor. Optionally, at the discretion of the corresponding teacher, in practices of the first semester, the questionnaire may be substituted for questions that will be included in a clearly separated and identified section at the end of the corresponding theory exam.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master Classes	16	0.64	3, 7, 5, 6, 8, 9
Practical sessions of Animal Management	45	1.8	6, 4, 9
Practical sessions of Bases	14.5	0.58	1, 5, 9
Type: Supervised			
Poster supervised	1	0.04	7, 5, 6
Type: Autonomous			
Animal management questionnaires	19.5	0.78	7, 5, 6, 9
Dairy and pig virtual farms	20	0.8	1, 5, 6, 9
Poster	4	0.16	7, 5, 6

Study	28	1.12	1, 3, 7, 5, 6, 8, 9

Assessment

For the calculation of the final grade of the subject the following qualifications will be taken into account:

- Evaluation of the Theory Exams (48% of the final grade)

As for the part of Bases of Animal Production, two partial tests of test type will be carried out, one of them on the part of ruminants and the other on that of monogastric animals, in which basically there will be questions of the theory of these parts of the subject, including also possible questions of practices and/or seminars for which no specific evaluation has been done, or any issue explained in the course of the management practices (for example of the part of pigs) related to the subject.

The weight of each of these exams will be 24% of the final grade of the subject, so the overall of the two theoretical exams represents 48% of the final grade. It is necessary to obtain at least a score of 3.5 out of 10 in each of these exams to be able to pass the global course (this is, it will not be average with the rest of the grades of the subject if a grade lower than the indicated one is obtained). In case of not obtaining the minimum required in the theoretical part, there will a chance to take a recovery exam.

- Poster evaluation (5% of the final grade)

Once the poster has been presented, it will be evaluated by the teacher who has tracked the group of students, taking into account the content of the poster and its formal presentation. The grade of the poster will count 5% of the final grade of the subject.

- Evaluation of milking cow work virtual farm (7.5% of the final grade).

It will be evaluated by the professor responsible for the seminar according to the results obtained by each student with the virtual farm of cows and will count 7.5% of the final grade of the subject.

- Evaluation of the work on the pig virtual farm (7.5% of the final grade).

It will be evaluated by the professor responsible for the seminar according to the results obtained by each student with the virtual pig farm, and will account for 7.5% of the final grade for the subject.

- Evaluation of the BP2 practice on pig sector (2% of the final grade)

At the end of the practice students will respond and submit a questionnaire that will account for the 2% of the final grade.

- Overall grade of the set of Animal Management practices, obtained as average of the notes of the different management practices, (30% of the final grade).

At the end of each practice (or a group of practices of a specific species or topic), students must respond and submit a questionnaire in writing. Each questionnaire will be evaluated (eg. from 0 to 10) and the score obtained will become part of the set of animal management grades that will be weighted to obtain the overall mark of this part. Alternatively, in the case of Animal Management practices that are taken during the first semester, and according to the corresponding teacher, the questionnaire of a practice (or group of practices) may be substituted or supplemented by a series of questions included at the end of the theoretical examination (in a separate section). So, if this is the case, after the theory questions, in the exams there will be a separate section with the corresponding questions related to Animal Management, which will be appropriately evaluated and the score obtained will become part of the set of grades of the different Animal Management practices from which the final management grade will be calculated (weighting the scores according to the hours dedicated to each practice or group of practices) and will account for the 30% of the final grade.

It must be remembered that attendance at management practices is mandatory, and if someone does not attend a practice, they will not be evaluated the corresponding answers they may give in the exam related to the practice in question, unless their absence isproperly justified, eg. through a medical certificate.

Not evaluable

In general, it will be considered that a student is not evaluable if he/she has only participated in evaluation activities that represent less than 15% of thetotal grade.

English evaluation

Regardless of the content of the different parts that are made in English, which will be evaluated according to what it is indicated in the previous paragraphs, the level of English of each student will also be evaluated, from which, if applicable, a bonus will be added to the overall mark obtained from the subject.

For this purpose, at the end of the first theoretical exam (ruminants) there will be an optional part that the student (if he/she wants) will have to answer in English and they will serve exclusively to evaluate their linguistic competence. Therefore, there will an English assessment, answered in writing and in English to questions that will be asked after the theory test. These questions will be related to general aspects of this subject (ruminants production) or to the virtual farm of dairy cows.

As a guide, the assessment will be made as follows:

0 points: Insufficient in the written expression set, or does not participate. His vocabulary is poor and he does not understand or understand with much difficulty what he wants to express.

0.5 points: sufficient in the written expression set. He understands what he wants to explain although he makes several important grammatical or style mistakes and his vocabulary is limited.

1 point: correct written expression, even if minor errors are identified.

At the end of the course, the English score (valued over 1 point) will be added to the overall score of the subject. Depending on the grades obtained in each case, this can mean an approximate increase of around 5-10% of the overall mark of the subject. The teacher will be the one who will ultimately mark the final bonus that the student willreceive (between the range of "no bonus" to + 1 pointon the content note) on the overall mark ofthe subject. This bonus cannot be used to try to raise the theory score, if it does not reach the minimum required to average with the other marks.

ATTENTION

This subject does not provide for the single assessment system

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Animal management practices	30%	0	0	6, 4, 9
Dairy cows virtual farm	7.5%	0	0	1, 5, 6, 9
Individual tests type (Theory and/or Anim. Management)	48%	2	0.08	1, 2, 3, 7, 5, 6, 8, 9
Pig sector (BP2 Practice)	2%	0	0	7, 6
Pig virtual farm	7.5%	0	0	1, 5, 6, 9
Poster	5%	0	0	7, 5, 6

Bibliography

1. General Animal Production and censuses

http://www.fao.org

http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

http://www.europa.eu.int

http://www.marm.es/

http://www.mapya.es

http://www.gencat.cat/darp

http://www.cast-science.org

http://www.who.org

1. Poultry

Abad y Col. 2003. Reproducción e Incubación en Avicultura. Real Escuela de Avicultura.

Sauveur. 1988. Reproduction des Volailles et Production d'oeufs. Ed. INRA.

Castelló, Pontes y Franco.1989. Producción de Huevos. Real Escuela de Avicultura.

De Blas C. y Mateos G.G. 1991. Nutrición y Alimentación de Gallinas Ponedoras. Ed.

Ministerio de Agricultura, Pesca y Alimentación, Aedos y Mundi-Prensa.

Castelló y Col. 2002. Producción de Carne de Pollo. Real Escuela de Avicultura.

Leeson y Summers. 2000. Broiler Breeder Production. University Books

Klasing. 1998. Comparative avian nutrition. CAB International

Appleby, Hughes y Mench. 2004. Poultry Behaviour and Welfare.

Web pages:

http://www.wpsa-aeca.com

http://www.institutohuevo.com

http://www.agriworld.nl/

http://www.thepoultrysite.com

http://www.Avicultura.com

http://www.hyline.com/

http://www.hendrix-poultry.nl/

http://www.aviagen.com/

http://www.cobb-vantress.com/

http://www.ansc.purdue.edu/poultry

1. Swine

Books

J. Gadd, (2011) "Modern pig production", ISBN: 978-1-907284-47-2.

J McGlobe & W. Pond (2003) "Pig production: biological principles and aplications", ISBN: 0-8273-8484-X.
C.I. Whittemore & I. Kiriazakis (2006) "Whittemore's science and practice of pig production", ISBN 978-1405124485

Web pages:

www.3tres3.com
www.thepigsite.com http://www.3tres3.com

1. Ruminants

Books

AFRC. Energy and protein requirements of ruminants. CAB International, Oxon-UK, 1993.

Allen, D. Planned beef production and marketing. BSP Professional books, 1990. (*)

Buxadé, C. Producción vacuna de leche y carne Colección "Zootecnia, Bases de Producción Animal". Tomo VII. Mundi Prensa, 1996.

Buxadé, C. Vacuno de carne: aspectos claves. Mundi Prensa, 1997. (*)

Buxadé, C. Vacuno de leche: aspectos claves. Mundi Prensa, 1997. (*)

Cordonnier, P. Economie de la production laitière. Tec & Doc-Lavoisier, Paris, 1986.

De Blas, C. Producción extensiva de vacuno. Mundi Prensa, 1983.

Garnsworthy, P.C. (Edit.). Nutrition and lactation in the dairy cow. Butterworths, 1988.

Gravert, M.O. (Edit.); Dairy cattle production. Elsevier, 1987.

Holg, L.; Biología de la reproducción bovina. Editorial científico-técnica, 1987.

INRA. Alimentación de los Rumiantes. Mundi-Prensa, 1981. (*)

INRA. Alimentación de Bovinos, ovinos y caprinos. Mundi-Prensa, 1990. (*)

INRA. Alimentation de bovins, ovins et caprins. Tables Inra 2007. Éditions Quae, 2007

Maas, J. Beef cattle nutrition. The Veterinary Clinics of North America 7:1. Saunders Co., Philadelphia, 1991.

N.R.C. Nutrient Requirements of Beeff Cattle (7^{th} ed.). National Academy Press, Washington, 1996.

N.R.C. Nutrient Requirements of Dairy Cattle (7^{th} ed.). National Academy Press, Washington, 2001. (*)

N.R.C. Nutrient Requirements of Small Ruminants. Sheep, goats, cervids, and new world camelids, Washington, 2007. (*)

Peters, A.R. y Ball, P.J.H.; Reproducción del ganado vacuno. Acribia, 1991. (*)

Perry , T. W. y Cecava M. J. Beef Cattle Feeding and Nutrition (2^{ond} ed). Academic Press, San Diego, 1995.

Purroy, A.; La cria del toro bravo. Mundi-Prensa, 1988.

Roy, J.H.B.; The calf, Vol 1. Management of health. Butterworths, 1990.

Roy, J.H.B.; The calf. Butterworths, 1980. (*)

Sanz, E., Buxadé, C., Ovejero, I.; Bases para el diseño de alojamientos e instalaciones ganaderas. Associació d´Enginyers Agrònoms de Catalunya. Barcelona, 1988. (*)

Sniffen, C.J. y Herdt, T.H. Dairy nutrition management. The Veterinary Clinics of North America 7:2. Saunders Co., Philadelphia. 1991. (*)

Thickett, B., Mitchell, D., y Hallaws, D.; Cria de terneros. Acribia, 1989.

Webster, J.; Understanding the dairy cow. BPS Professional Books, 1987. (*)

Van Horn, H.H. y Wilcox, C.J. Large Dairy Herd Management. American Dairy Science Association, Champain, IL. 1992. (*)

Wolter, R. 1994. Alimentation de la vache laitière. Editions France Agricole, 1994.

Periodic publications

Mundo Ganadero

Tierras

Frisona Española

Bovis

Production Laitière Magazine

Dairy Herd Management

Hoard's Dairyman

Web pages:

http://www.anembe.com/

www.oviespaña.com

http://www.iga-goatworld.com/

RECOMMEMDED READING

We recommend reading the Handbooks (Manuals de Maneig/Manuales de Manejo) for the different types of animals, available on the Virtual Campus.

Software

For activities related to the Virtual cow farm, the Granja Virtual de Vacas 3.0 software (www.granjadevacas.es) is used.

For activities related to the Virtual pig farm the Granja Virtual Pigs 1.0 software (http://pigs.smartlivestock.com) is used