

Year : 2018/19

28925 - Production of monogastric animals

Syllabus Information

Academic Year:	2018/19
Subject:	28925 - Production of monogastric animals
Faculty / School:	201 -
Degree:	437 - Degree in Rural and Agri-Food Engineering
ECTS:	6.0
Year:	3
Semester:	Second semester
Subject Type:	Compulsory
Module:	---

General information

Aims of the course

The subject and its expected results correspond to the following approaches and objectives:

This subject is oriented to the learning of the systems of production of monogástricos. That will allow the student to know and approach the management of this type of livestock.

Context and importance of this course in the degree

It is part of the common compulsory training for all students of the Specialty degree: "Animal Farming", for this reason it offers an overview of the differences, both in the systems of exploitation of the different species of interest cattle, and the Latest techniques for each group. As we have already said, the interest of this group of animals is maximum within the cattle ranch.

Recommendations to take this course

For the better follow up of the subject it is advisable to have passed the subjects: Mathematics II, Animal Science I, Statistics, Ecology and management of agroindustrial byproducts. It is also convenient:
- Have basic knowledge of Spanish/English for the understanding of scientific-technical texts.

Learning goals

Competences

Upon passing the subject, the student will be more competent to ...

Generic:

In general terms, the student must possess and understand knowledge in a study area related to production; Know how to apply the knowledge to their work in order to solve problems within their area of study; Acquire the ability to collect and interpret relevant data to make judgments; To be able to transmit information, ideas, problems and solutions and, to be able to undertake later studies with a high degree of autonomy. In the following table we show an assessment of the objectives:

No.

INCIDENCE

INSTRUMENTS

1

Capacity for analysis and synthesis

high

2

Ability to organize and plan

Moderate

3

Oral and written communication

Moderate

4

Foreign Language Knowledge

Weak

5

Computer knowledge

Weak

6

Ability to manage information

Moderate

7

Problem resolution

high

Referring to Fig.

Decision making

Moderate

News

9

Teamwork

Moderate

10

Working in an international context

Weak

eleven

Skills in interpersonal relationships

Weak

12

Recognition of diversity and multiculturalism

Weak

13

Critical thinking

Moderate

14

Ethical Commitment

high

SYSTEMS

fifteen

Autonomous Learning

high

16

Adapting to new situations

Weak

17

Creativity

Moderate

18
Leadership
Weak

19
Knowledge of other cultures and customs
Weak

twenty
Initiative and entrepreneurship
Moderate

twenty-one
Motivation for quality
high

22
Sensitivity for environmental issues
Moderate

OTHER COMP. TRANSVERSALES

2. 3
Ability to apply knowledge in practice
Moderate

24
Basic knowledge of the profession
high

25
Ability to communicate with non-experts
Moderate

Specific:
- EC.22. Ability to know, understand and use the principles of animal production technologies: animal anatomy; Animal physiology; Animal production, protection and exploitation systems; Animal production techniques; Genetics and animal breeding and feed formulation
- Acquisition of basic knowledge on the Pork, Poultry and Cunicultural Sector: market situation, farming systems, breeding and feeding technologies, genetic improvement, growth and development, egg production, facilities and equipment.
- Application of basic knowledge to phenomena and processes related to livestock production.
- Contrast theory and current production.
- Learning the skills needed for work in farms

Learning goals

The student, to overcome this subject, must demonstrate the following results ...

To be able to establish the criteria of reproduction, lactation, growth, feeding and genetics that allow to optimize from a technical-economic point of view the production of monogastric farms.

Be familiar with the facilities and management of the most current monogastric production systems under adequate hygienic sanitary conditions with a commitment to the conservation of the environment and the sustainable use of its resources.

Be able to analyze the productive parameters and identify the critical points of the processes to establish practices of continuous improvement.

Be able to analyze the most important monogastric production systems to understand the role of monogastric production at both national and global levels.

Be familiar with the most important legal regulations.

Be able to show a critical and responsible attitude for quality, environmental and animal welfare issues.

Know how to access sources and access routes to cutting-edge research.

Be able to work in a team, including open communication, mutual respect, and ethical values.

Importance of learning goals

The competences that are achieved contribute to the understanding of the operation of the systems of monogastric cattle exploitation without forgetting the rural socioeconomic environment where it is possible its development.

The student will have developed reasoning and critical thinking skills.

Assessment (1st and 2nd call)

Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he / she has attained the expected learning outcomes through the following assessment activities

The students must pass a global test, similar in the two official examinations of the academic year, following the official calendar of exams of the EPS. The evaluation, which will be 0 to 10 points, will consist of three elements:

- 1.-Theoretical examination, P1, (60% of the final grade)
- 2.-Group work, P2: Delivery of a notebook of visits to a cattle operation, exhibition and public defense of the same (10% of the final note)
- 3.- Individual work of prospecting and / or bibliographic review, P3, (30% of the final grade).

Evaluation Criteria (clearly specify for evaluation activity)

The weighting of each test or work to obtain the final grade will be as follows:

P1) The written test (60% of the grade) will include questions on content theory and practice and will consist of two parts, a) consisting of questions requiring short answers (limited response tests) and b) option test questions multiple. The first type of test will evaluate the ability to organize and structure information, as well as ability to synthesise, analyze and clarify responses, while the second will measure the ability to relate, interpret, evaluate, extrapolate, etc.

P2) Test 2 (group work) may be evaluated during the academic year based on the following criteria and requirements: Elaboration of a report (10% of the final grade), its exposure and public defense of the practical work entrusted on the description, analysis and operation of a livestock operation that the students, in a group of no more than 5.

Attendance to at least 80% of the compulsory practices in the group of practices assigned, not being able to change groups without justification.

The work will be presented and defended by each group of students at the end of the semester in seminar-type sessions, in which the authors should intervene to explain and argue some of the points contained in the report, discuss them and discuss them with the rest of participants The seminars (teachers and students). The time available for the presentation and defense of the theme during the seminar sessions will be 15 to 20 minutes. In addition, students will submit a self-assessment form filling out their work on the team. At the end of the exhibition, the rest of the students will also complete another evaluation form of the work of the classmates.

The qualification will be realized taking into consideration: a) content of the memory: 50%; B) formal aspects of the same: 20%; C) exposure and defense (30%).

Those students who have not been evaluated in the test 2 during the academic year must deliver an individual work on the date of the official call, whose content must have been previously accepted by the teacher of the subject. The evaluation criteria will be similar to those specified for students who have been tested for this test 2 during the course.

P3) Test 3, prospecting and / or bibliographic review (30% of the final grade), will consist of a review of a scientific article and a legal regulation of the EC.

Test 3 (individual survey work and / or bibliographic review) may be evaluated during the academic year, by delivery at the end of the quarter.

Those students who have not been evaluated in test 3 during the academic year must submit the individual work of prospecting and / or bibliographic review on the date of the official announcement.

The qualification will be made taking into account 50% the level of understanding of each of the works.

Final note

In order for the student to pass the subject within the 2 official examinations, it is necessary to:

1. Obtain a grade higher than 0 in each of the parts of the final exam (test 1) (theory questions, short practice questions) and obtain at least a 4.5 in the final mark of test 1.
2. Obtain at least a 4 in the work of prospecting and / or bibliographic review, test 3, (if the grade is less than 4, students will be suspended for the next course).

The final grade of the subject (CF) will be determined by the following equation:

$$CF = 0.6 \text{ Note P1} + 0.1 \text{ Note P2} + 0.3 \text{ Note P3}$$

In order to pass ($CF \geq 5$) it is essential that:

$$NP1 \geq 4.5 \text{ (with a score greater than 0 on each of the parts)}$$

$$NP3 \geq 4.0$$

In the event that the requirements of the previous section are not met, the final grade will be obtained as follows:

If $CF \geq 4$, the final grade will be Suspended (4.0)

If $CF < 4$, the final grade will be Suspended (CF)

The tests surpassed in the first call will be saved for the second call of the same academic year.

Methodology, learning tasks, syllabus and resources

Methodological overview

The learning process that is designed for this subject is based on the following:

The subject has a specific character orientation, so that the activities proposed focus on the various factors that involve, involved and influence farming systems and production processes of monogastric farm. It is imposing an overview of the theory and practice, supported by laboratory practices and visits to farmers, conducting individual tutoring work and another group where the student must demonstrate their ability to work in teams and to expose and defend the report on issues related to the subject. This report should be prepared following the guidelines and format similar to the specification of a PFR presentation and be in <http://jescos.unizar.es>. To better track the learning process will encourage students to use the tutorials through various systems and methods: conventional tutorials and more specific tutorials related to practical work. Professor facilitate your schedule as much as possible with the availability of the student.

Learning tasks

The program that the student is offered to help you achieve the expected results includes the following activities ...

interactive lectures. Study and individual / group work.

ECTS credits: 4

Teaching methodology:

- Lecture dialogue.
- Problem-based learning.
- Cooperative learning
- Agreement learning.

Practical classes of problems. Study and individual / group work.

ECTS credits: 1

Teaching methodology:

- Theoretical Troubleshooting.
- Problem-based learning.

ECTS credits: 1

Teaching methodology:

- Contact with the working reality.
- Individual study and work / group.

Syllabus

Theoretical program

The proposed program includes 24 units that will be taught in 40 theoretical sessions and 20 practical sessions. The theoretical program will be presented to the students during the first session and will be structured in three blocks for letting them have a more global view of the theoretical part of the subject.

Block I - Pig production (19 hours)

Unit 1.- Situation and problems of pig sector (1 hour) - 1. General ideas. 2. Importance of productions - census, productivity and economic value in the world, Europe and Spain. 3. Pig production systems in Spain - intensive farming (characteristics, classification, organization of production), extensive and semi-extensive farming. 4. Future perspectives in the EU environment.

Unit 2.- Reproductive management in pig livestock (3 hours) - 1 Short physiological review of pig reproduction. 2. Reproductive objectives. 3. Factors that influence breeding failing. 4. Strategies of reproductive intensification. 5. Labour induction and labour management. 6. Handling the sow during the post-partum and new-born care. 7. Handling the sow and the piglets while breastfeeding. 8. Mortality of suckling piglets. 9. Weaning and transition. 10. Handling the boar - factors that influence the reproductive efficiency of the male, reproductive and general handling. 11. Reproductive rates and reproductive efficiency.

Unit 3.- Genetic improvement in pig livestock (1 hour) - 1. Main breeds and crossbreeds used in pig production. 2. Aspects to take into account for genetic improvement and heritability. 3. Selection - objectives. 4. Cross-breeding - objectives and schemes of cross-breeding (two, three and four ways). 5. Possibilities of supply of hybrid females by the

farmer. 6. Hybridisation and selection in Spain.

Unit 4.- Management of feeding in reproductive pig livestock (3 hours) - 1. Importance, objective and short review of bases. 2 Foods and feeding systems. 3. Management of piglet feeding. 4. Sow feeding in reposition. 5. Management of sow feeding during the different stages of reproductive cycle (lactation, mating, gestation, post-partum) - capacity of ingestion, needs and recommendations. 6. Example of rationing. 7. Boar feeding. 8. Determination of physical condition.

Unit 5.- Intensive production of pig meat (2 hours) - 1. Introduction and objectives. 2. Analysis of the factors that influence the intensive fattening. 3. Phases of fattening and formation of lots. 4. Feeding during transportation and fattening - quantitative and qualitative criteria. 5. General rules for managing and for the environment in the phase of transition and fattening. 6. Peculiarities of growing-finishing of breeders.

Unit 6.- Extensive and semi-extensive pig production. (1 hour) - 1. Generalities. 2. Fundamentals and objectives of the extensive systems in the Mediterranean area. 3. Iberian pig - feeding, reproductive management and genetic improvement. 4. Campsite type farms. 5. Analysis of the interest of extensive pig production.

Unit 7.- Quality of carcass and pig meat (1 hour) - 1. Definition of carcass. 2. Classification of carcasses and carcass return. 3. Characteristics of pig meat. 4. Factors that influence the quality of carcasses and pig meat.

Unit 8.- Premises and equipment for pig livestock (4 hours) - 1. Introduction - general criteria of premises for pig livestock. 2. Characteristics of premises for pig livestock - environmental requirements, water consumption, behaviour and regulations. 3. Premises in intensive pig farms - housing for breeders. Housing for dry or pregnant sows - in group or in a fix place. Intensive housing for lactating sows - general criteria, dimensions of a farm based on management by lots, and productive level. Labour cell - general characteristics, cages, ground and heat sources for piglets. Housing for boars. Installations in premises for growing-finishing and fattening. 4. Installations in premises in extensive systems. 5. Installations for waste water and livestock excrement. 6. Hygiene and health management in pig farms - main infectious and parasitic processes and their control. Hygiene and farming wastes.

Unit 9.- Organization and control of pig farms (3 hours) - 1. Planning and organization of pig farm - conditioning factors. 2. Optimization of productive factors. 3. Aspects of the integration system in pig production. 4. Introduction of technical and economic pig management. 5. Control of results through technical and economic indexes. Study of a particular case - collection, register and processing of data. Analysis, interpreting and diagnosis. Decision making. 6. IT and management. 7 Ethnology. 8 Wastes. 9 I+D+i.

Block II - Poultry keeping (15 hours)

Unit 10.- Poultry farms (1 hour) - 1. Poultry industry and its evolution. 2. General characteristics of domestic poultry - physiological particularities. 3. Production types and systems. Censuses and productions in Spain - their distribution. 4. Economic importance of poultry keeping and future perspectives.

Unit 11.- Reproductive management and genetic improvement of hens (2 hours) - 1. Short physiological review of poultry reproduction. 2. Broodiness and moult. 3. The cycle of laying and its graphical representation. 4. Genetic improvement of hens - achievements. 5. Qualitative characters - its practical interest. 6. Quantitative characters in the improvement of eggs and meat. 7. Selection - current approaches. 8. Cross-breeding in poultry keeping - commercial hybrids. Interesting strains in Spain - return comparison and election criteria.

Unit 12.- Artificial incubation (2 hours) - 1. Initial embryonic development. 2. Handling the egg before incubation - collection, classification, treatments and storage. 3. Handling in the incubation room. Incubation - environmental conditions and general handling. Hatchability - variation factors. 4. Transfer to hatchers 5. Handling after the chicken is born. 6. Selection and transport. 7. Hygiene during the incubation process.

Unit 13.- Breeding and growing-finishing of pullets (1 hour) - 1. Zootechnical characteristics. 2. Housing systems - advantages and disadvantages; environment and necessary equipments. 3. General management. 4. Lighting programs for the growing-finishing process. 5. Practical feeding rules. Food restriction - interest and necessary conditions. 6. Breeding of future breeders - differentiating features.

Unit 14.- Exploitation of breeder hens (2 hours) - 1. General characteristics. 2. Housing, environmental conditions, installations and equipment. 3. General management. 4. Productive returns. 5. Feeding rules. Feeding management in heavy breeders. Dual feeding. 6. Hygiene during the collection of hatching eggs.

Unit 15.- Exploitation of commercial laying hens (2 hours) - 1. Battery farming - housing, environmental conditions, installations and equipment, regulations. 2. General management. 3. Productive returns. 4. Feeding rules. 5. Alternative systems to battery farming.

Unit 16.- Production of poultry meat (2 hours) - 1. Broiler chicken - productive characteristics. 2. Factors that influence productivity in fattening. 3. Rules for housing, environmental conditions, installations and equipment. 4. General management. 5. Feeding. 6. Systems for obtaining label chickens.

Unit 17.- Quality of eggs, carcass and poultry meat (1 hour) - 1. The importance of quality. 2. Parameters of external and internal quality of eggs, variation factors and possibilities for improvement. 3. Parameters of external quality of the carcass and modifying factors. 4. Return, conformation and composition of the carcass. 5. Quality of meat and its variation factors.

Unit 18.- Development of a farm (2 hours) - 1. Technical and economic factors - valuation and combination. 2. Objectives - quality of the carcass. 3. Register and control of the refunds. 4. Quality control of poultry products. 5. Regulations. 6. Management. 7. Production costs. 8. Ethnology. 9. Wastes. 10. I+D+i.

Block III - Rabbit keeping (6 hours)

Unit 19.- The specie (1 hour) - 1. Original species. 2. Biology and behaviour. 3. Reproductive potential. 4. Mortality - pathologies, vaccines. 5. Domestication. 6. Comparison with other species in the market. 7. Environmental needs.

Unit 20.- Production of the sector (1 hour) - 1. Global production. 2 Consumption in Spain and other countries. 3. Market prices. 4. Market evolution. 5. Exploitation by Spanish regions. 6. Rabbits by Spanish regions. 7. Zootechnical classification. 8. La Lonja Ibérica. 9. SANDACH.

Unit 21.- Rabbit farms (1 hour) - 1. Fundamentals and environmental needs. 2. Premises: area and material. 3. Housing or rabbit hutch - types, mother cages, nests, broiler cage, cages for males, materials, drinking troughs. 4. Cleaning equipments - detections. 5. Ecological farms - objectives, El majano.

Unit 22.- Reproduction (1 hour) - 1. Reproduction - sexual organs. 2. The male. 3. Male/female. 4. The female - pseudo-gestation, acceptance and mating, mating and elimination, the female and its environment. 5. Reproductive control - induction of receptivity. 6. Genetic improvement - simple cross-breeding (2, 3 and 4 ways), backcrossing, objectives of selection in rabbit keeping, selected lines in Spain. 7. Artificial insemination. 8. Gestation and labour - diagnosis, nests, birth.

Unit 23.- Feeding and management (1,5 hours) - 1. Lactation - milk, lactation and weaning. 2. Digestive system of rabbits. 3. Cecotrophía. 4. Farm management. 5. Fattening. 6. Reposition. 7. Production. 8. Farm management - traditional, extensive, semi-extensive and intensive systems. 9. Female rabbit, cages and young rabbits. 10. Management in bands. 11. Diseases - eliminations, diseases by categories, digestive pathologies. 12. Formulation - fibre, quantity, energy, production peculiarities, feedstuff.

Unit 24.- How to create a rabbit farm (1,5 hours) - 1. Ethnology - race, strain and line, races by product, commercial hybrids. 2. Creating a farm - production costs. Basic and objective considerations, behaviour, global objective. 3. Controlling the farm - files of males and females, productive indexes, example. 4. Wastes - organic and inorganic wastes, uses, how to act, manure/agricultural land, composition and comparison with other species. Estimate of the produced quantity. 5. Regulations: RAMINP, procedure. 6. I+D+i - comparison with other species, productive indexes, France vs. Spain.

Content of practical sessions

PRACTICAL SESSIONS (20 hours)

Practical session 1.- Visit and discussion intensive pig farm (4 hours)

Practical session 2.- Visit and discussion broiler hen farm (3 hours)

Practical session 3.- Visit and discussion chicken farm (3 hours)

Practical session 4.- Genealogic analysis - calculation of inbreeding coefficient (1 hour)

Practical session 5.- Determination of the quality of the eggs for consumption and incubation (2 hours)

Practical session 6.- Determination of the quality of meat (2 hours)

Practical session 7.- Technical and economic management of livestock. Search of information and functioning of Software for livestock management (1 hour)

Practical session 8.- In-class sessions about the control systems of critical points. Calculation of indexes for quality control and farm management (2 hours)

Group tutorials(2 hours)

Practical session 10.- Visit and discussion farm selected by students (not taken into account for final mark/grade)

Course planning and calendar

Schedule sessions and presentation of works

Weeks	Lectures	Lab practices	Seminars outputs field	Individual work	Evaluation
1	2			5	
2	2		4	15	
3	2		3	12,5	
4	2		3	12.5	
5	4			10	
6	4			10	
7	4			10	
8	4			10	
9	4			10	
10	2	1		7,5	
11	2	2		10	
12	2	2		10	
13	2	1		7,5	
14	2	2		10	

15	2	2		10	
16					5
Total	40	10	10	150	5

The programmed activities correspond to lectures (30 hours), classroom practices (5 hours), laboratory practices (13 hours) and visits to facilities (12 hours).

Each student will take an examination after the end of the teaching period (examination period), on the date established by the center.

Bibliography and recommended resources

- BB** Buxadé Carbó, Carlos. El pollo de carne : sistemas de explotación y técnicas de producción / Carlos Buxadé Carbó ; con la colaboración de Ismael Ovejero Rubio ; prólogo de E. P. Adsuar . [2a. ed. rev.] Madrid : Mundi-Prensa, 1988
- BB** Buxadé Carbó, Carlos. La gallina ponedora : sistemas de explotación y técnicas de producción / Carlos Buxadé Carbó ; ed., act. y amp. Madrid [etc.] : Mundi-Prensa, 2000
- BB** Castelló Orvay, F. (1993) Acuicultura marina: fundamentos biológicos y tecnología de la producción. Barcelona: Publicacions i Edicions de la Universitat
- BB** Control de la reproducción en el conejo / obra colectiva dirigida y coordinada por Mario R. Alvariño . [1ª ed.] Madrid : Ministerio de Agricultura, Pesca y Alimentación, IRYDA : Mundi-Prensa, 2000
- BB** Ganado porcino : diseño de alojamientos e instalaciones / Fernando Forcada... [et al.] . Zaragoza : Servet, D.L. 2009
- BB** Hernandez-Vergara, M.P., Perez-Rostro, C.I. (2014). Sustainable Aquaculture Techniques. Autores
- BC** Alimentos y racionamiento / coordinador y director Carlos Buxadé Carbó ; con la participación de 29 autores . Madrid [etc.] : Mundi-Prensa, 1995
- BC** Avicultura clásica y complementaria / coordinador y director Carlos Buxadé Carbó ; con la participación de 18 autores . Madrid [etc.] : Mundi-Prensa, 1995
- BC** Baselga Izquierdo, Manuel. Mejora genética del conejo de producción de carne / M. Baselga Izquierdo, A. Blasco Matute . [1a. ed.] Madrid : Mundi-Prensa, 1989
- BC** Estructura, etnología, anatomía y fisiología / coordinador y director Carlos Buxadé Carbó ; con la participación de 21 autores . Madrid [etc.] : Mundi-Prensa, 1995
- BC** Forcada Miranda, Fernando. Alojamientos para ganado porcino / Fernando Forcada Miranda . 1ª ed. Zaragoza : Mira, 1997
- BC** Genética, patología, higiene y residuos animales / coordinador y director Carlos Buxadé Carbó ; con la participación de 29 autores . Madrid [etc.] : Mundi-Prensa, 1995
- BC** Guía John Gadd de soluciones en producción porcina / [revisado por] Lorenzo Fraile] ; [traducción : Jesús Laborda, Sergio Fuentes] ; [edición de] Belén González] . Zaragoza : Servet, Diseño y Comunicación, L. 2005
- BC** Orozco Piñán, Fernando. Mejora genética avícola / Fernando

- BC Orozco Piñán . [1a. ed.] Madrid : Mundi-Prensa, 1991
Porcinocultura intensiva y extensiva / coordinador y director Carlos Buxadé Carbó ; con la participación de 26 autores . [etc.] : Mundi-Prensa, 1996
- BC Producción animal acuática / coordinador y director, Carlos Buxadé Carbó ; con la participación de 23 autores . Madrid : Mundi-Prensa, 1997
- BC Producción caprina / coordinador y director Carlos Buxadé Carbó ; con la participación de 28 autores . Madrid [etc.] : Mundi-Prensa, 1996
- BC Producción ovina / coordinador y director, Carlos Buxadé Carbó ; con la participación de 25 autores . Madrid [etc.] : Mundi-Prensa, 1996
- BC Producción vacuna de leche y carne / coordinador y director Carlos Buxadé Carbó ; con la participación de 23 autores . [etc.] : Mundi-Prensa, 1996
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- BC Tratado de cunicultura. Vol.1, Principios básicos, mejora y selección, alimentación / por Francesc Lleonart Roca...[et al.] . [1a. ed.] Arenys de Mar (Barcelona) : Real Escuela Oficial Superior de Avicultura, 1980
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- BC Tratado de cunicultura. Vol.3, Patología e higiene / por Francesc Lleonart Roca . [1a. ed.] Arenys de Mar (Barcelona) : Real Escuela Oficial y Superior de Avicultura, 1980

LISTADO DE URLs:

- American Association of Swine Veterinarians, AASP-USA
[<http://www.aasp.org/>]
- Asociación Nacional de Porcinocultura Científica, Anaporc (España)
[<http://www.anaporc.com/>]
- Carabaño, R.(2003). Sistemas de producción de conejos en condiciones intensivas. En XXXVII Reunio Anual da SBZ, Viçosa-MG, 24 a 27 de Julho-2000 (pp. 17-37)
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- Cepero, R. (1996). Avances en la investigación sobre calidad del huevo. Selecciones Avícolas, 4, 133-144
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- La puerta a la avicultura en Internet
[<http://www.avicultura.com/>]
- Multi-State Feeding and Nutrition Publications
[<http://ag.ansc.purdue.edu/poultry/multistate/publication.htm>]
- Nutrient Requirements of Poultry
[<http://www.nap.edu/openbook.php?isbn=0309048923>]
- Ros breeders: Manual de manejo del pollo de engorde, 2000
[http://es.aviagen.com/assets/Tech_Center/BB_Foreign_La]

Suscribirse cerdos-I, mensaje maiordomo@3tres3.com
[http://www.3tres3.com/]

The updated recommended bibliography can be consulted in:
<http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=8086>