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REPORT ON THE VISIT TO
THE FACULTY OF VETERINARY MEDICINE OF
ZARAGOZA

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INTRODUCTION

The Faculty of Veterinary Medicine of Zaragoza (FVMZ) was visited by the team of experts from 21 – 27 February 2006. This was the 2nd evaluation of the FVMZ, the first having taken place in 1994. During the evaluation the team visited the facilities, looked at the teaching resources that were available to the Faculty, and had discussions with academic and support staff, students, alumni and local practitioners, as well as several meetings with the Dean and other senior staff from the Faculty and University.

Two months prior to the visit the experts had received from the Faculty a Self-Evaluation Report (SER) and the supporting documentation. Each expert was assigned specific chapters of the SER related to his/her particular area of expertise to study and evaluate in greater detail. Further information relating to each of the chapters was obtained during the visit itself.

The Faculty of Veterinary Science was founded in 1847 and is currently located on the Miguel Servet Campus in Zaragoza, half way between Madrid and Barcelona. Since the previous evaluation, the most noticeable changes have been the building of the Veterinary Teaching Hospital, the Food Processing Pilot Plant and the renovation of the Animal Experiment Support Service premises (including a new building for teaching with animals). The number of teaching and auxiliary staff has increased whilst the number of students has decreased. In terms of teaching, the most notable change has been the publishing of the new syllabus which is now almost fully implemented.

Evaluation visits represent a 'snapshot' of the situation at the time of the visit. Establishments often respond rapidly and positively to comments and suggestions, even before the report is issued, but any changes made after the visit will not be reflected in this text.

Evaluation visits involve a great deal of work for all concerned - academic staff, support staff, and students. The team of experts is most grateful for the open and friendly way in which it was received throughout the visit. The experts are particularly grateful to (*usually Dean and team, SER person, liaison, translation*) for the substantial help that they gave before and during the evaluation visit.

1. OBJECTIVES

1.1 Findings

The main stated objective of the Faculty of Veterinary Science of Zaragoza is to prepare qualified professionals adapted to the needs of today's society by means of quality teaching and research.

The general objectives of the FVMZ in relation to the Degree in Veterinary Science are those approved by the Faculty Board in 1992:

- To provide adequate basic training to enable the graduate to go on later to specialise in other areas of veterinary activity and keep up to date with continual scientific and technological innovations;
- To provide students with the knowledge and ability to handle the most relevant information resources from a critical point of view;
- To teach students to use scientific methods and handle the basic instruments available for their application;
- To encourage students to develop a practical approach to problem solving via process analysis, the assessment of alternative solutions and their cost, and decision making;
- To encourage the correct attitude and development of the skills required for interdisciplinary working groups;
- To report on the implications involved in exercising the veterinary profession in their field of work and within the framework of the socioeconomic activity as a whole.

There are specific objectives covering the aims within each subject of the curriculum.

In 2003, the Dean's Team drafted a strategic plan for the Faculty, including general and specific training objectives and an outline of the actions needed in order to achieve them. Translated, the (abbreviated) main points the Strategic Plan are to:

- Strengthen and consolidate the Veterinary Campus, improve its functioning as well as the quality of its infrastructures and the services of the Veterinary Faculty;
- Have the Veterinary Faculty play an important role in the regional, national and international arena by promoting collaboration and interaction with other research and teaching institutions and stimulating transfer of results of its research projects into practical applications;
- Improve the quality of teaching thus going towards market demands within the main frame of the so called "European space of higher education" ;
- Prepare the Veterinary Faculty for the EAEVE visit.

The Faculty mentions that budgetary constraints have caused difficulties with, or failure of, some of the lines of action proposed. A lack of understanding by the local authorities with regard to the site and activities of a veterinary faculty within a changing town plan is also a challenge.

Among its strengths, the Faculty mentions:

- The location of the FVMZ in a farming region;
- Some new buildings (Teaching Hospital, Pilot Plant, Encephalopathies Centre)
- Well-qualified and experienced staff;
- Good teaching support (Library, audiovisual service);
- Able students

As weaknesses the Faculty includes:

- Problems of space, infrastructure and access as regards the Campus site;
- Aging of staff, due to limitations on hiring new personnel;
- Shortage of staff in some administrative and technical areas;
- Some lack of space within specific facilities and buildings;
- Some safety aspects and procedures need to be addressed;
- A need to improve contacts with outside bodies (e.g. for placements, commercial bodies).

The FVMZ also outlines some opportunities, including:

- Prospects offered by the new buildings, and the conversion of vacated premises;
- The development plans formulated by the Faculty and Region, along with the reference point of the previous evaluation report;
- Improvement of contacts and relations with European and international organisations;

- Limited entry of students enabling favourable teaching conditions

As threats, it mentions;

- The opening of the new Teaching Hospital harming relations with practitioners;
- Competition from other faculties with better resources;
- Focussed research (funding) causing deprioritisation of teaching and some research fields;
- Difficulties for younger staff to have a stable career.

1.2 Comments

The stated objective of the Faculty correctly identifies its main teaching role.

Since a faculty should be a cohesive academic body in its field, it would be advantageous for the FVMZ to have a greater role in shaping and integrating the veterinary course and its teaching (see Also Chapters 2 and 4). It should also have an involvement in research, which is currently organised on a purely departmental basis.

The Strategic Plan is well laid out, with a clear statement of objectives covering education, research as well as service provision. However, it does not have a time frame. Strategic plans should concern a specific window of time, and targets on the priority list should be labelled as “achievable by...”. It is also desirable for all parties involved (Faculty, University, Ministry and other governing authorities) that such plans are linked to agreed resourcing (in terms of finance, staff, etc.) on the one hand, and ‘deliverables’ on the other. As well as providing participants with clarity as to what is expected, such an agreement also reduces the risk of plans failing due to lack or withdrawal of resources.

The major deficiencies highlighted in the 1994 visit report are addressed as a specific objective in the Strategic Plan. However, current deficiencies appear not to have been critically assessed, such as the quality of premises of the equine section of the teaching hospital, or the insufficient exposure of students to swine, bovine and avian medicine and health.

Strengths are properly indicated, although the Faculty does not seem to realise the potential offered by the large farm animal population in the region of Aragón, in particular the very high numbers of sheep. Lack of grasping this opportunity may soon turn into a weakness or threat if, for instance, ovine farmers continue to reduce their use of veterinary services (a trend that is already apparent).

As additional strengths, the team considers that the Faculty should have mentioned:

- The decrease in student intake since the last evaluation;
- The increase in practical work in the new curriculum.

As additional weaknesses, the team considers that the Faculty should have mentioned:

- The lack of flexibility and integration in the curriculum (see also Chapter 4);
- A poor ratio of theoretical:practical work, and a shortage of ‘core’ clinical work.

The strengths and weakness of the establishment are discussed in more depth in subsequent chapters of this report.

The remarks made in subsequent chapters of this report will have a strong bearing on the extent to which the Faculty achieves the objectives of a veterinary training establishment.

1.3 Suggestions

- 1.1 The strategic plans of the Faculty should have a timetable for completion, and be linked to an agreement on resourcing by the authorities responsible.
- 1.2 Some specific weaknesses of the Faculty, and plans for rectifying them, should be highlighted.

The need for the Faculty to have more influence over teaching and research is mentioned in Suggestion 2.1.

2. ORGANISATION

2.1 Findings

The establishment is one of 23 faculties, polytechnical centres and university schools of the University of Zaragoza, which comes under the responsibility of the Ministry of Education and Science and of the Government of the Autonomous Community of Aragón. The Aragónese Government establishes university titles and the general guidelines for the study programmes.

The main governing entities of the University of Zaragoza are the Rector and the University Senate, in which the Dean of the FVMZ represents the Faculty. The University also has a 'Social Board' that acts as a channel of communication between society and the University, so that they may express their needs and requirements to each other.

The main decision-taking entities of the FVMZ are the Dean, the Faculty Board, the Faculty Commissions and the departments. The Faculty also has an Administrative and Services Unit headed by an Administrator is responsible for all managerial aspects. As well as being the head of all administrative and service staff of the Faculty, the Administrator ensures decisions concerning the budget and administration are carried out, in coordination with the Dean.

The Dean heads the Faculty, directs and manages the general running of the Faculty, and is its representative. He/she is appointed for four years by the University Vice Chancellor after being elected by the Faculty Board and can serve two consecutive terms. The Dean is assisted by five Vice-Deans, three Dean' Deputies and two senior administrators.

Faculty Board comprises *ex officio* members (the Dean, Vice-Deans and the Secretary) and elected representatives of the staff (36), students (21) and administrative and support staff (3). Its duties include supervising the management, organisation and regulations of the Faculty, deciding upon courses and the attribution of subjects within them and approve annual reports and accounts.

Eight Commissions assist the Dean in the execution of the Faculty policies (Permanent Commission, Teaching Commission, Teaching Assessment Commission, Academic Commission for International Exchanges, Sports Commission, Culture Commission, Study Programme Development Commission and Library Commission).

Departments are a 'parallel' structure to the faculties within the University. By law, they each cover a specified ('knowledge area'), which cannot be duplicated within a University (e.g. it is not allowed to have two departments that cover the same knowledge area in different faculties). Departments have a large degree of authority and autonomy on the conduct and delivery of academic work within their knowledge area.

Each department is composed of a director, elected by the Department Council from amongst the lecturers with a doctoral degree. The Department Council is integrated by all doctor members of the department, a proportional number of representatives of the rest of the teaching and research staff, of representatives of the registered students, and of representatives of the support staff.

There are four departments centered in the FVMZ which primarily teach veterinary science subjects, but have sections in other faculties/polytechnics/university schools:

- Department of Agriculture and Agrarian Economy;
- Department of Anatomy, Embryology and Animal Genetics;
- Department of Veterinary Medicine;
- Department of Animal Production and Food Science.

Teaching is also provided by branches of seven departments based in other faculties/polytechnics/university schools Departments:

- Department of Anatomical Pathology, Legal Medicine, Forensic Science and Toxicology
- Department of Biochemistry, Molecular and Cellular Biology
- Department of Pharmacology and Physiology

- Department of Applied Physics
- Department of English and German Philology
- Department of Applied Mathematics
- Department of Chemical Analysis

Two special units that support important veterinary curriculum components - the Veterinary Teaching Hospital (VTH) and the Food Processing Pilot Plant (FPTT) – have a certain degree of autonomy from Faculty. The VTH is responsible for organising hospital work for the Faculty and coordinating teaching together with the related Departments. It is a body of University Governing Council, managed by a Director and a team of two sub-directors for the areas of small and large animals. The Pilot Plant is dependent on the Veterinary Faculty Board, and is responsible for organising and coordinating teaching and research related to food processing technology.

2.2 Comments

With a parallel structure of Faculty and departments, the organisation of the FVMZ is not straightforward for an outside team to fully understand. Departments are very independent, and are the main decision-taking bodies on academic matters, including on the teaching in ‘their’ knowledge area (see also Section 4.1). The Faculty and its organs seem mainly to be restricted to administrative and managerial matters.

The current structure, and its consequences, gives the team some concerns about the training. Firstly, as the content and delivery of teaching allocated to a particular department is the responsibility of that department alone, active coordination and integration of content depends entirely on goodwill and personal contact. An interdisciplinary approach is not used. Secondly, the knowledge area *per se* can be given precedence over veterinary medicine as a whole. In several areas departmental activities – the team is in particular considering teaching – have become too far removed from ‘real’ veterinary activities. The Faculty has to have a greater capacity to direct the teaching towards overall and applied veterinary needs. It is the stated objective of the Faculty to provide training that equips graduates for such work.

At present, the work of the teaching commissions of the Faculty is primarily administrative coordination. A curricular review body is needed to continuously reflect and improve the course and teaching. In particular, more ‘decompartmentalisation’ of the teaching is needed. Subjects should have a clear and direct orientation to their application in veterinary activity or in subsequent parts of the course.

The team would also note that research and postgraduate training is also currently a departmental responsibility. As an academic establishment, the Faculty should have some role in these areas. Research and postgraduate training need to be cohesive, and directed towards veterinary aims, rather than being fragmented into the priorities of ‘knowledge areas’.

The various structures of the Faculty provide for effective representation of groups concerned with and involved in veterinary education (teachers, students and support staff).

Remarks on the clinical organisation have been made in Section 6.2. Having an organisationally separate Hospital (and Pilot Plant) is unusual.

2.3 Suggestions

- 2.1 The Faculty should have a clearer and more authoritative role in directing academic activities (e.g. undergraduate teaching, postgraduate training and research) within the FVMZ.
- 2.2 The Faculty should have an authoritative body for curricular review, responsible for the active coordination and integration of the teaching of different subjects, and ensuring that the teaching in all areas and disciplines is oriented towards ‘end-user’ needs.

3. FINANCES

3.1 Findings

The income and expenditure of FVMZ for 2004 are summarised in Tables 3.1 - 3.4.

Table 3.1: Income of the FVMZ (2004)

Source	€	%
Revenue for salaries from public authorities	8,938,312	83.29
Revenue from public authorities for central costs	92,928	0.87
Revenue from private bodies		
Revenue from research	1,355,692	12.63
Revenue earned and retained by the FVM		
- registration fees from students		
- from continuing education		
- from clinical activities	306,076	2.85
- from diagnostic activities		
revenue from other sources (rental, services, etc.)	38,585	0.36
Total	10,731,593	100

Note: only the revenue for central costs and from 'other sources' is in fact part of the operating budget of the FVM.

The main funding from the state is a grant from the Autonomous Regional Government. The University retains the tuition fees from the students, and income from some other sources (see below). From these funds, the University pays staff salaries directly, and covers its other central costs. The remaining amount is divided into broad areas (teaching programmes, research, investment). The sum for the teaching programmes is further partitioned between different general expenses, money for supporting off-site work, and incentives (performance related), grouped into funds destined for faculties and departments. The funds for investment are likewise split into money for infrastructure costs (60% for maintenance, 40% for furniture) and teaching equipment.

Table 3.2: Subdivision of University teaching funds

	Total (€)	Faculties (€)	Departments (€)
General Expenses	3,518,609	1,040,782	247,827
External Practices	226,291	47,506	178,785
Incentives	233,000	105,000	128,000
Infrastructure	300,506	300,506	-
Teaching equipment	329,620	164,810	164,810

The distribution between faculties and departments of the sums for the teaching programme and for investment is based on particular criteria, as tabulated below. 20% of the allocation to faculties is attributed to the faculty libraries using a different basis.

Table 3.3: Weighting factors for resource allocation

	Teaching programme funds		Investment	
	for faculties and departments	for libraries	maintenance & repairs	furniture
students' fees (i.e. credits taught)	70%	70%	10%	10%
hours of dedication of the ascribed teachers	15%		10%	20%
surface area of the centre	5%		30%	5%
growth of the centre			20%	25%
building age			18%	20%
distance from the central University site	5%			
number of loans of bibliographical funds		10%		
teaching offer dispersion		5%		
expenses per loan		5%		
expenses per registered credit		5%		
fixed allocation	5%	5%	12%	20%

There is only a minor amount of scaling or differentiation as regards the experimental nature of a particular discipline.

The budget for external work is allocated according to applications made by the various departments. In 2004, 7,200 € was provided to the FVMZ for this purpose.

The teaching programme money allocated to the Faculty (44,165 € and 9,808 € for the library) is for central costs, such as general management, utilities, administrative costs, etc. Departments are responsible for the organisation and funding of teaching activities requested by faculties. The Faculty and departments have a relatively high degree of autonomy to decide upon expenditure, although subject to audit and other administrative control.

Fees at the University are based on the number of teaching credits for which the student is enrolled. For a veterinary student, this corresponds to an average of about 1050 € per year. The cost of re-enrolling for a discipline (i.e. not passing the examination) rises progressively.

Clinical activities are conducted within the Veterinary Hospital, which is an administratively and financially separate body of the University. Clinical income is used for consumables, equipment and staff salaries and supplements.

Table 3.4: Expenditure of the FVMZ (2004)

Item	€	%
Salaries		
- teaching staff	4,577,172	38.0
- support staff	3,360,413	27.9
- research staff	1,000,727	8.3
Operating costs		
- specific to teaching	374,600	3.1
- specific to research	1,021,750	8.4
- general operations	582,686	4.8
- utilities	280,177	2.3
Equipment		
- research	501,599	4.2
- teaching & general	180,826	1.5
maintenance	181,645	1.5
Total	12,061,595	100

	€
Annual direct cost of training a student	7831
Total direct cost of training a graduate	51330

3.2 Comments

It should be noted that training a veterinarian is inevitably more expensive than nearly all other disciplines. Veterinary studies are predominantly practical, and require intensive clinical training in small groups. Hospital and emergency services have to be staffed around the clock. In addition to the manpower demands, practically-based training is costly in terms of equipment, materials and consumables, and there are transport costs associated with bringing animal material in, and taking students out to facilities such as farms and food handling and processing establishments.

The resources needed for veterinary training and thus similar to those required in human medicine, which is often indirectly subsidised through government funding of teaching hospitals. There is not any adequate recognition of this cost in the funding system, with minimal apparent scaling or differentiation in allocation relative to non-experimental disciplines. In general terms, veterinary training costs around 9 times the amount per student as a humanities course (without including staff costs in the calculation).

The fact that the extent of practical training is not taken account of in the budget allocation model also places the FVMZ at a heavy comparative disadvantage. The intensity of training that makes veterinary

education so expensive also means that it is very difficult and undesirable for the Faculty to increase student numbers, which is one of the easiest ways to increase the budget allocation. Other faculties with a lower and less expensive practical component to their teaching (or none at all) can more readily raise student numbers.

It should also be noted that a model that is based on the number of credits taught encourages maximising of teaching hours, or, conversely, would heavily penalise the reduction in formal teaching necessary to reduce student workload (see Section 4.1). In short, the funding model in its current form encourages quantity, which will have a negative effect on the quality of training.

There is a major discrepancy (an order of magnitude) between the funding allocated to the Faculty for teaching and expenditure on such work and on equipment for teaching. It is evident (and also stated in the SER) that departments have to support the costs of teaching. However, the overall University budget for teaching activities (c.f. Table 3.2) seems simply too low to cover the expenditure. Teaching activities are most likely having to be paid for out of other departmental revenue, probably from research work. This gives rise to several concerns that relate directly to the teaching:

- Since departments decide what form their teaching takes, and must fund it, the nature of such work will vary hugely according to the ability and willingness of departments to deploy funds on training;
- Departmental funding of teaching reinforces a sense of departmental ‘ownership’ of that subject;
- Even if the Faculty were to produce a teaching programme or ethos, it has no funds to implement it. Departments could justifiably refuse on financial grounds.

Problems with funding will primarily affect teaching of a practical nature. This, unfortunately, is the area of most concern (see Chapter 4).

In more general terms, the FVMZ has very little financial means at its disposal. This limits its ability to influence or be proactive as regards academic activities in which a veterinary faculty would normally have a leadership role.

3.3 Suggestions

- 3.1 There should be adequate funding of teaching activities, in particular a well-structured programme of practical work.
- 3.2 The Faculty should have more financial control and leverage, in particular so that it can specify (and support) an appropriate level of structured practical teaching.
- 3.3 The funding allocation model used by the University should take account of the extent to which a course is of an experimental nature, using a realistic view of the actual costs of a training programme.

4. CURRICULUM

4.1 GENERAL ASPECTS

4.1.1 Findings

Studies at the Veterinary Faculty of Zaragoza last 5 years (10 semesters of 15 weeks), with the average duration of attendance currently being around 6½ years.

Under national laws all university studies consist of core and elective subjects. The latter, which make up 10% of teaching time, are not necessarily related to the specific studies. A minimum number of core hours is specified for each area of study, e.g. medicine, veterinary science, law, etc, but there is no maximum limit of credits. The regulations also establish the minimum component number of practical and theory classes.

Like all nationally-recognised degrees, the veterinary course is specified within a law that sets out the subjects, their credits, when they are taught, and the 'knowledge area' (see also Chapter 2) that must teach them. The Faculty is responsible for implementing the undergraduate curriculum and assigns the teaching of each subject to a department according to its particular 'knowledge area'. Within the national outline of a subject, course content and delivery depend upon the academic staff responsible for the subject.

A new syllabus was started in 2002, in which the number of hours of practical training was increased considerably. The time allocated to theoretical and practical teaching is summarised in Tables 4.1 to 4.3.

Table 4.1: Teaching hours in 'EEC' subjects

	lectures	practical work	supervised work	clinical work	other	total
A. BASIC SUBJECTS						
Anatomy (including histology and embryology)	150	135				285
Biochemistry	60	32	8			100
Biology (incl. cell biology)	30	30				60
Biophysics	30	10	10			50
Biostatistics	30	20				50
Chemistry	30	20				50
Epidemiology	30	15				45
Genetics	45	16	14			75
Immunology	30	15				45
Microbiology	60	30				90
Parasitology	45	20				65
Pathological anatomy (macroscopic and microscopic)	90	75		15		180
Pharmacology	69	18	18			105
Pharmacy	6	4				10
Physiology	75	42	8			125
Physiopathology	60	14	16			90
Scientific and technical information and documentation methods						
Toxicology (inc. environmental pollution)	45	5	15			65
B. Animal production						
Agronomy	45	20				65
Animal behaviour (inc. behaviour disorders)	22.5	7.25			2.75	32.5
Animal husbandry (inc. livestock production systems)	140	34	30		26	230
Animal nutrition and feeding	60	28	32			120
Animal protection and welfare	22.5	7.25			2.75	32.5
Environmental protection	10	10				20
Preventive veterinary medicine (inc. health monitoring programmes)	30	5	10			45
Reproduction (inc. artificial breeding methods)	20	6				26
Rural economics	30	15				45

C. Clinical subjects						
Anaesthesiology	10	20				30
Clinical examination and diagnosis and laboratory diagnostic methods	45				30	75
Clinical medicine	75			90	15	150
Diagnostic imaging	30			8		38
Obstetrics	22			13	15	50
Reproductive disorders	33			31		64
State vet. medicine, zoonoses, public health and forensic medicine	150	60	25			235
Surgery	50			60	15	95
Therapeutics						
D. Food hygiene						
Certification of food production units	5	2				7
Food certification	5	2				7
Food hygiene and food quality (inc. legislation)	40	16				56
Food inspection, particularly food of animal origin	40	8	5		12	65
Food science and technology	60	40	10			110
E. Professional knowledge						
Practice management						
Professional ethics	10	2.5	2.5			15
Veterinary certification and report writing	10	2.5	2.5			15
Veterinary legislation	10	2.5	2.5			15

In addition to the veterinary disciplines, 1st year students have to take 60 hours of training in biomedical English or German.

Table 4.2: Distribution of practical and theoretical teaching in EEC subjects

	hours in course						percentage of total course hours	ratio of lectures to other types of work
	lectures	practical work	supervised work	clinical work	other	total		
Basic subjects	885	501	89	15		1490	46.6	1:0.68
Animal production	380	132.5	72		31.5	616	19.3	1:0.62
Clinical subjects	415	80	25	202	75	737	23.1	1:0.92
Food hygiene and technology	150	68	15		12	245	7.7	1:0.63
Professional knowledge	30	7.5	7.5			45	1.4	1:0.5
Other subjects	30	30				60	1.9	1:1
Total	1890	819	208.5	217	118.5	3253	100	1:0.72

Attendance to the academic activities related to the subjects is in principle compulsory. However, participation is only controlled in practical classes (clinical practice, etc) via the students signing lists, so there is in practice no obligation to attend theoretical classes.

The academic regulations of the University required that for lectures the intake of 155 students is divided in two groups of 75 - 80 students.

The ratio of core theoretical training to practical and clinical training is about 1:0.72 (1890:1363).

The ratio of core intramural clinical training to theoretical and practical training is about 1:14.0 (217:3036).

In addition to the core teaching, students must complete 225 hours of elective subjects, the bulk of which (180 hours) are in the second cycle. These 2nd cycle electives are grouped into six branches or intensifications (see also Annex I):

- Biotechnology applied to veterinary sciences;
- Pet medicine and surgery;
- Animal production
- Animal protection and environmental conservation;

- Public health and food control
- Food technology.

Although the FVMZ subjects listed (see Annex I) are related to veterinary training, students may choose any disciplines they wish from other syllabi and/or from the departmental and virtual subjects offered by the University. Electives credits can also be acquired by through the recognition of other subjects passed in other official studies and through the recognition of free-choice credits from other courses or activities (on prior request and approval from the Teaching Commission).

In addition to the structured teaching, students have 150 or 300 hours (15 credits) of compulsory extramural work under the supervision of an external tutor in the 4th and 5th years. The host organizations can be companies (public, private, mixed), education centres, research centres, public administrations, non-governmental organizations, etc.

Table 4.3: Summary of total hours in each year of the present course

year	course hours						ratio of lectures to other types of work	average weekly hours
	lectures	practical work	supervised work	clinical work	other work	total		
First	345	246.5	18		5.5	615	1: 0.78	20.5
Second	390	203	22			615	1: 0.58	20.5
Third	435	134	106	23	30	728	1: 0.67	24.27
Fourth	375	120		134	71	700	1: 0.87	23.33
Fifth	345	115.5	62.5		12	535	1: 0.55	23.26
Total	1890	819	208.5	157	118.5	3193	1: 0.69	19.83

Note: These hours are calculated from the annual tabulations of the courses in the SER, not from Table 4.2.

4.1.1 Comments

The curriculum at the Faculty is for the most part that defined in Spanish law. This sets out the subjects, their credits, when they are taught, and the ‘knowledge area’ that must teach them. Such a very restrictive way of defining the curriculum is not appropriate for a dynamic subject such as veterinary medicine. Many of the shortcomings of the course are a result of the national curriculum – for example inflexibility in allocation of teaching hours, a crowded curriculum, and significant weaknesses in some fields. This way of defining the veterinary course also compartmentalises the teaching.

The allocation of hours between the subject areas is imbalanced. Too many hours are spent on basic sciences and in the area of animal production. In consequence, there are far too few ‘core’ hours available for clinical disciplines.

The team was pleased to note that the proportion of practical work in the teaching had increased significantly since the first evaluation of the FVMZ in 1994. However, there are still too many lectures in relation to other types of teaching. This is particularly noticeable in some disciplines that should be based on practical work – (e.g. radiology, propaedeutics). Also, some work that is rather theoretical in nature, such as videos, computer classes and seminars to large groups is classed as practical work.

With nearly 1900 hours of lectures, there is a heavy theoretical teaching load for both undergraduates and staff. The workload is increased for the latter by having to repeat each lecture, a practice which adds little or no extra value to learning. Staff time would be much more usefully spent on other teaching work.

The ratio of core clinical work:practical and theoretical training is unacceptable relative to the minimum value of 1:9 required for this indicator. Undergraduates do not have sufficient hands-on clinical work to provide a basic level of competency on graduation. It is noted that the ‘core’ teaching at the Faculty is supplemented by electives and extramural work. However, there is an obligation to ensure that all students have a minimum level of training in the different fields and across the species. Extramural work is a supplement to, not a substitute for, structured clinical training by the Faculty.

The way the curriculum is organised means that each subject and its teaching is a separate entity. There is

no interdisciplinary teaching of core course subjects. Any input to, or active discussion of, content between vertically- or horizontally-related subjects is dependent upon personal relations. There is also no body or structure that provides an overview or direction to teaching, making the course a mosaic. This compartmentalisation weakens the teaching, as it is difficult for students to make the link between different topics. There needs to be explicit provision for interdisciplinary teaching to counter the current segregation.

In several areas, disciplines would be considerably enhanced by a much greater orientation to their application in subsequent phases of the training or professional veterinary activity. The general principle is that the content and delivery of the different disciplines should not be decided independently, but that teaching should be clearly oriented towards 'end-user' needs. Thus, the applied part of the training on clinical work, food safety and veterinary public health, and production animal health and productivity should explicitly be proportioned and directed towards ensuring that on graduation students have the entry-level knowledge and skills to take on professional responsibilities in these fields. The earlier parts of the training should explicitly be aimed at providing the necessary basis for the applied part of the training, with the content being largely determined by the teachers and teaching needs in the applied areas.

The elective subjects and extramural work are good developments in the curriculum. A more systematic structure to such activities, such as more direction/progression in the extramural work, and a clear focus by each student towards a particular area of veterinary work in the choice of electives, could be beneficial. In all the tracks, the elective disciplines are also predominantly theoretical in nature, whereas the principle of such work should be to build on applied skills. Since they are counted as core credits, more attention has to be paid to the extramural work carried out, since some students only seem to have about 150 hours of placements, rather than 300.

4.1.3 Suggestions

- 4.1 The FVMZ, and the authorities who have responsibility for the regulation of the syllabus, should systematically 'decompartmentalise' the curriculum, to explicitly allow and encourage interdisciplinary teaching, and to facilitate or require active horizontal and vertical interlinking of content.
- 4.2 There should be an authoritative Faculty Curriculum Committee or similar body that has the power to direct, shape and integrate the content taught by different departments into a cohesive whole.
- 4.3 The curriculum should be structured using an 'end user' approach, so that the teaching in the final years is explicitly aimed at equipping students with the knowledge and skills they need for professional activity, that the earlier teaching directly supports this, and that the allocation of curricular hours reflects this objective.
- 4.4 The curricular hours attributed to the basic sciences and animal production disciplines should be reduced, considerably in the case of the latter, and the amount of time spent on clinical subjects increased.
- 4.5 The proportion of work of a practical or tutorial nature should be improved, by increasing the amount of practical and supervised work, and considerably reducing the number of lectures. Lectures should not be repeated.
- 4.6 The amount of intramural hands-on clinical training in the core course must be increased. (*Category 1 suggestion*)
- 4.7 The elective work should have a greater practical component, and its overall structure be directed at providing students with a greater experience in a specific veterinary field.
- 4.8 The extramural work should have a clearer structure that is more oriented towards complementing the formal teaching by the Faculty.

4.2 BASIC SUBJECTS AND BASIC SCIENCES

4.2.1 Findings

The curriculum hours in the basic subjects taught to veterinary students are shown in Table 4.4. The attribution of these hours according to the 'EEC' subjects is shown in Table 4.1.

Table 4.4: Number of teaching hours in 'core' basic subjects

subject	year	hours in course					ratio of lectures to other types of work
		lectures	practical work	supervised work	clinical work	total	
Physics	1	30	10	10		50	1: 0.67
Chemistry	1	30	20			50	1: 0.67
Biology	1	30	30			60	1: 1
Mathematics	1	30	20			50	1: 0.67
Anatomy	1	90	90			180	1: 1
Biochemistry	1	60	32	8		100	1: 0.67
Physiology	2	75	42	8		125	1: 0.67
Genetics	2	45	16	14		75	1: 0.67
Cytology & histology	2	60	45			105	1: 0.75
Epidemiology	2	30	15			45	1: 0.5
Microbiology	2	60	30			90	1: 0.5
Immunology	2	30	15			45	1: 0.67
Parasitology	2	45	20			65	1: 0.44
Pharmacology, pharmacy & therapeutics	3	75	22	18		115	1: 0.53
General pathology	3	60	14	16		90	1: 0.5
General pathological anatomy	3	45	15		15	75	1: 0.67
Special pathological anatomy	4	45	60			105	1: 1.33
Parasitic diseases	5	60	35	10		105	1: 0.75
Infectious diseases	5	90	25	15		130	1: 0.44
Toxicology	5	45	15	15		75	1: 0.67
Total		1035	571	114	15	1735	1: 0.68

In addition to the core course, the elective group 'Biotechnology applied to veterinary sciences' (see Section 4.1 and Annex I) provides some students with additional teaching in the basic science fields.

For practical work, the intake is divided into 12 groups of 13-14 students, with sessions repeated 12 times.

Anatomy dissection is based mainly on sheep and dogs.

4.2.2 Comments

The admissions procedure (see Chapter 9) means that the students' level of knowledge of physics and mathematics is very variable. The Faculty has to provide school-level teaching in these subjects, and also needs to reinforce school level chemistry. It would be far better if the students selected had an appropriate foundation of these basic subjects before they started on the veterinary course *per se*. The FVMZ could then dispense with providing such teaching.

The basic sciences are covered in considerable depth. As mentioned in the previous sections, there is a need to reduce the amount of teaching in these fields, mainly through reductions in the number of lectures, which is far too high. The number of lectures in the quite substantial disciplines of anatomy, cytology/histology, general pathology and infectious diseases could be reduced by around . Similarly, the lecture hours in microbiology, immunology and parasitology could be significantly reduced. In contrast, it would be useful to increase the amount of supervised work aimed at stimulating self-directed study by the students.

The group size used for practical teaching is commendably small, although the number of repeats this

requires does increase the teaching load of the staff. The rooms for practical work are good and well-adapted to small group teaching.

Although subjects are taught separately (see preceding section), the Teaching and Curriculum Committee looks at the course content to avoid overlaps and gaps. More applied material needs to be incorporated into the basic science teaching, and these disciplines clearly oriented towards their veterinary use.

There is a need to coordinate the practical work between Microbiology and Immunology and the infectious diseases.

The staff in parasitology and infectious diseases would like to have greater involvement in clinical activities. A closer collaboration between parasitologists / infectologists and clinicians at the Teaching Hospital would be positive for both areas. This does not require starting a parasitology service within the VTH, but is more a case of getting a parasitologist involved with cases where his/her knowledge and experience might be put into practice. Similarly, services such as faecal counts or parasite identification should be provided on a routine basis by parasitologists, rather than the Hospital paying a private company for such work.

4.2.3 Suggestions

The need to reduce the amount of teaching in the basic sciences, in particular the theoretical load, has been mentioned in Suggestion 4.4

- 4.9 A proportion of the lecture hours in the basic sciences (especially anatomy, cytology/histology, general pathology, infectious diseases, microbiology, immunology and parasitology) should be replaced by problem-oriented learning in small groups.

Suggestion 9.1 concerns the need to improve the student selection procedures and intake requirements, so that the undergraduates starting the veterinary course have an adequate level of knowledge in the basic subjects (physics, chemistry, mathematics and biology).

See also Suggestion 6.6 regarding the involvement of some of the paraclinical sections in the Hospital.

4.3 ANIMAL PRODUCTION

4.3.1 Findings

The topics taught in animal production subjects are shown in Table 4.5. The attribution of these hours according to the 'EEC' subjects is shown in Table 4.1.

Table 4.5: Number of teaching hours in 'core' animal production subjects

	year	hours in course						ratio of lectures to other types of work
		lectures	practical work	supervised work	clinical work	other work	total	
Ethology, animal protection & ethnology	1	45	14.5			5.5	65	1: 0.44
Agronomy & agricultural economics	2	45	20				65	1: 0.44
Animal breeding & health	3	60	15	30			105	1: 0.75
Animal nutrition	3	60	28	32			120	1: 1
Animal production & vet. hygiene	4	90	19			26	135	1: 0.5
Economics applied to the agrifood sector	4	30	15				45	1: 0.5
Preventive medicine & sanitary policy	5	30	5	10			45	1: 0.5
Total		360	116.5	72		31.5	580	1: 0.61

The course 'obstetrics and reproduction' (see Table 4.6) includes animal production aspects of these topics.

In addition to the core course, the elective groups 'Animal production' and 'Animal protection and environmental conservation' (see Section 4.1 and Annex I) provides some students with additional teaching in some animal production topics.

The FVMZ keeps some teaching animals in the Animal Experiment Support Service (AESS) 'farm' on the campus, as outlined in Chapter 7.

4.3.2 Comments

As noted in Section 4.1, the agronomy and animal production subjects are allocated a far higher number of curricular hours than is customary for veterinary courses in many European countries. The teaching includes the classic disciplines of animal science and general aspects related to the agricultural sector. A substantial proportion of this material is not a priority for a modern veterinary course, and needs to be drastically cut back to make for other content. More generally, much of the content of the animal production 'disciplines' should be integrated into broader and species-based teaching of the field in their (appropriately scaled) applied context.

Currently, the teaching is presented in a mainly theoretical way, both in terms of the balance between lectures and practical work, and in the sense of not adopting an 'on-farm' perspective. The animal production teaching that is carried out on farms by private practitioners working as adjunct professors is very useful, but seems to be given little or no link to the education provided within the Faculty. The teaching at the FVM also does not cover or relate to any issues of animal health, which belongs to a different 'knowledge area'. This seriously weakens the coverage of farm animal veterinary work. Important issues, such as mastitis and infertility, for example, seem to be missing or very incompletely covered.

Animal welfare is not adequately addressed in the teaching. The first year course, which only includes a few hours on animal protection, is rather early, and applied aspects of the subject do not seem to sufficiently covered. Shortcomings in animal welfare were also noted at the Faculty:

- Some of the teaching animals had conditions that were not being treated (e.g. laminitis);
- some of the facilities (e.g. the paddocks) were manifestly unsuitable for veterinary work from a welfare perspective;
- there were some concerns about the extent to which animal use in teaching was limited (e.g. rectal palpations).

Such issues, all of which could be relatively simply and constructively addressed, should not be allowed to arise at a veterinary training establishment.

The team was pleased to hear that the animal production teachers wanted to have greater involvement in issues of animal health. A closer focus on the relationship between production aspects and animal health is essential, since the reality of veterinary activity on farm animals is that these two aspects are inextricably interrelated. This implies a welcome integration and applied orientation of the animal production disciplines, which need to be based around systematic programmes of multi-disciplinary visits and analysis of working farms in the region. The teaching of a herd-health approach, including the relative costs of ill-health compared with treatment strategies, should be a priority.

European laws are moving towards an integrated approach to monitoring, control and certification of animal health, food safety and quality assurance right through the food chain. This 'stable to table' approach is a very clear veterinary responsibility. It should be reflected in the structure and orientation of veterinary training.

The low value of individual farm animals, in particular sheep, and the increasing cost of veterinary services, also means that herd health management should be emphasised as an aid and support to farmers. This would be best developed as a mobile clinic, based in and run by the Faculty with the active participation of FVMZ clinicians and animal production units. As part of such an approach, the Faculty could participate actively in the management and running of a 'model' farm, to demonstrate to farmers the ways herd health management can help them improve profitability. This would be a better and far more structured approach to teaching than paying a number of adjunct professors to take undergraduates out to farms without even providing a clear concept of what students should learn there.

4.3.3 Suggestions

The need to substantially reduce amount of teaching hours allocated to the animal production area is mentioned in Suggestion 4.4.

- 4.10 The animal production teaching should dispense with the pure animal science and general agronomical and zootechnical elements, and focus clearly on the production aspects that are directly relevant to applied veterinary activity.
- 4.11 The animal production disciplines should have a much greater practical component, taught predominantly using a problem-oriented on-farm approach, and with close linkage of the theoretical teaching programme to the practical activities.
- 4.12 The animal production teaching should be coordinated and integrated, both within the field and with health issues, so that multifactorial issues of productivity and health are comprehensively addressed in a structured way.
- 4.13 More attention should be paid to practical aspects of animal welfare in the teaching as well as in the facilities and procedures of the FVMZ.

4.4 CLINICAL SCIENCES

4.4.1 Findings

Clinical subjects are taught by the Department of Veterinary Medicine and the Department of Anatomical Pathology, Legal Medicine, Forensic Science and Toxicology. Clinical training is predominantly carried out in the Veterinary Teaching Hospital (VTH - see Section 6.2). Many of the academic staff of the clinical departments also provide clinical services in the VTH, but this is not a contractual obligation.

The obligatory courses in clinical subjects and the teaching hours are outlined in Table 4.6. The attribution of these hours according to the 'EEC' subjects is shown in Table 4.1.

Table 4.6: Number of teaching hours in 'core' clinical subjects

subject	year	hours in course						ratio of lectures to other types of work
		lectures	practical work	supervised work	clinical work	other work	total	
Propaedeutics	3	45				30	75	1:0.67
Radiology	3	30			8		38	1:0.27
Medicine & clinical surgery	4	60	20		30	15	125	1:1.08
Medical & nutrition pathology	4	75			60	15	150	1:1
Obstetrics & reproduction	4	75	6		44	15	140	1:0.87
Veterinary Teaching Hospital	4 or 5				60		60	1:-
Deontology, legal medicine & legislation	5	30	7.5	7.5			45	1:0.5
Total		315	33.5	7.5	202	75	633	1:1

In addition to the core course, the elective group 'Pet medicine and surgery' (see Section 4.1 and Annex I) provides some students with additional teaching in the clinical area. Many students also elect to spend all or part of their extramural training periods (see Section 4.1) in a clinical field.

In three core clinical disciplines, 4th year undergraduates have 120 hours of rotations. During 8 weeks students have 3 hours of training per day in the VTH, two of which are spent in the large animal clinic and six weeks in the small animal clinic. Of the two weeks for large animals, one is for farm animals (sheep, pigs and cows) and the other for horses. In both areas, surgery, internal medicine and reproduction and obstetrics and are studied. In the small animal area, two weeks are spent in internal medicine, two in medical-surgical specialisation one in reproduction and obstetrics, and one week in anaesthesia and resuscitation. There is no training in avian medicine either in poultry or pet birds.

Medical and Food Pathology - Internal Medicine Small Animals - Specialisation: <i>Dermatology; Exotic animals; Ethology; Oncology</i> - Horse Clinic - Farm Animal Clinic	60 hours 2 weeks x 3 h day = 30 h 4 days x 3 h day = 12 h 3 days x 3 h day = 9 h 3 days x 3 h day = 9 h
Reproduction and Obstetrics - Small animal surgery - Horse clinic - Farm animal clinic	24 hours 1 week x 3 h day = 15 h 1 day x 3 h day 3 h 2 days x 3 h day = 6 h
Clinical Medicine and Surgery - Small animal operating surgery - Small animal traumatology - Small animal ophthalmology - Anaesthesia and recovery - Horse Clinic	36 hours 3 days x 3 h day = 9 h 2 day x 3 h day = 6 h 1 day x 3 h day = 3 h 1 week x 3 h day = 15 h 1 day x 3 h day = 3 h
Total in 4th year	120 hours

In the 2nd cycle of the degree, students have the core subject 'Veterinary Teaching Hospital' with 60 hours of clinical teaching in 3-hour rotations during four weeks of training in the VTH. Two weeks are spent in the large animal clinic (one for horses, one for farm animals) and two weeks in the small animal clinic.

<i>Clinical work at hospital (5th year)</i>	<i>60 hours</i>
- Small animal operating theatre	5 days x 3 h days = 15 h
- Horse clinical training	5 days x 3 h days = 15 h
- Farm animal clinical training	5 days x 3 h days = 15 h
- Small animal internal medicine	5 days x 3 h days = 15 h

Equine clinical teaching is provided either at the VTH, or is off-site and supervised by practitioners who are adjunct professors. Most of the clinical training on farm animals (pigs, sheep and cows) is also provided through the mobile activities of practitioners who are on a contract at the Faculty as adjunct professors, who take students with them to visit their own customers' farms when they are called. At the time of the visit the FVM had within the clinical field 4 adjunct professors for horses, 2 for pigs, and 1 each for sheep, cattle and exotics/wild animals.

Students can volunteer to participate in the emergency service of the VTH either during term-time or as 'placement' students in July and August. After 22:00 students only stay at the hospital if necessary, but have to be available on-call for emergencies.

The animal material sent to the University and seen by the mobile clinic is detailed in Chapter 7.

4.4.2 Comments

The major problem in the clinical disciplines is that not curricular enough hours are allocated to these subjects (see also Section 4.1). In almost all areas and species the time is insufficient for staff to provide adequate coverage. There is noticeably not enough hands-on clinical training in the core course.

The level of small animal clinical activity is generally satisfactory for supporting training, and with the new Hospital the Faculty can look forward to the caseload developing. Students could be given greater involvement in the cases attending the Veterinary Teaching Hospital. For examples they could have the initial responsibility for the initial reception and history-taking of the animal and the owner, for 15 or 20 minutes, rather than the client being presented directly to the teaching clinician. This would give the students training on the initial examination of a patient, before this was checked by the clinical teacher, who could then guide the student in further work.

As noted in Section 6.2, enormous progress has been made recently in equine work. The Faculty needs to consolidate and continue progress in this area, in particular by reinforcing the staff working in the Equine Clinic, and by rectifying some design flaws in the premises.

There is a major need to improve the production animal work. As mentioned in Section 4.3, there is an illogical separation between 'production' issues (e.g. nutrition, environment, breeding, housing, etc.) and matters concerned with 'health' (e.g. lameness, mastitis, infertility, sub-clinical conditions). This does not reflect the close interaction of these aspects or the reality of farm animal veterinary practice, and such separation has a very negative effect on the teaching.

Furthermore, even within the 'clinical' area of production animal work, there is a strong need to clearly base teaching on real veterinary work. The teaching course is too often decoupled from actual clinical activity and applications. A significant number of academic staff giving the lectures and demonstrations in the farm animal area do not appear to have any involvement in actual cases or farm animal health management (academic contracts refer only to teaching and research duties, not to clinical services). All such applied aspects, and the 'hands-on' teaching and clinical activity in the farm animal area seem to be provided by practitioners recruited as adjunct professors, using their clientele. There appears to be very little contact with the academic teaching staff of the Faculty as regards the programme for such work. There is no control of the outcomes for the students or evaluation of the teaching by the practitioners. The result is that enthusiastic students can benefit from good amount of clinical material, whilst the majority are poorly served.

The role of the adjunct teachers is immensely valuable to the Faculty. Without it, there would be no meaningful contact with farm animals, or connection to the clinical reality of production animal work. However, handing over the practical side of production animal teaching without any interaction with the structured teaching, and without any effective Faculty-organised farm animal work is inappropriate. In

effect, there is no structured programme of farm animal clinical or health work or FVMZ or departmental control over the practical teaching or competence of students.

The Faculty needs to have a structured and cohesive training programme covering the health and productivity of the major food animal species (cattle, swine, small ruminants and poultry) in an applied problem-oriented way. This means that the different clinical aspects, issues of production and the applied aspects of the on-farm manifestation, diagnosis, prophylaxis/treatment/prevention, economics and relations with a producer need to be presented together, as working examples of the kind of challenge farm animal veterinarians have to deal with.

The Faculty must have a viable farm animal activity on which to base its academic teaching. This does not mean a large hospital-based farm animal activity, as treatment and health management should be predominantly an 'on-farm' activity. The team is also not suggesting that the Faculty tries to establish and manage its own farm - it is far cheaper and more effective to work with 'real' commercial farms. It does need to develop - or buy - a production animal mobile practice that encompasses animal health and productivity work [i.e. the structured on-farm work mentioned earlier], as well as reactive single-animal treatment.

The amount of time students spend on farm animal work, within a clinical teaching programme that generally has too few hours, does not give students enough hands-on experience in the core course. As about 30% of the graduates will subsequently work later in the field of farm animals (production medicine) this needs to be addressed.

4.4.3 Suggestions

The need to increase the amount of curricular time allocated to the clinical disciplines has been mentioned in Suggestion 4.4.

Suggestion 4.6 concerns the requirement to increase the amount of hands-on clinical work.

- 4.14 The Faculty engagement in farm animal teaching and clinical services must be improved, including:
- Integrating the teaching on production aspects with that on farm animal health, so that it coherently addresses inter-related veterinary problems that span these fields;
 - Establishing sound and credible production animal health services based on the Faculty (see also Suggestion 6.3 on a mobile clinic);
 - Requiring that the staff who are providing teaching on farm animal issues have a strong participation in activities and veterinary problems 'in the field'.
 - Ensuring the FVMZ provides control and direction over the practical teaching and evaluation on production animal work in this area, which must be closely linked to the structured teaching programme at the Faculty.

(Category 1 suggestion)

4.5 FOOD HYGIENE AND TECHNOLOGY AND VETERINARY PUBLIC HEALTH

4.5.1 Findings

Table 4.7: Subjects and of teaching hours in 'core' food hygiene subjects

subject	year	hours in course					ratio of lectures to practical work
		lectures	practical work	supervised work	other work	total	
Food science & technology	3	60	40	10		110	1: 0.83
Hygiene, food inspection & control	5	90	28	5	12	135	1: 0.5
Total		150	68	15	12	245	1: 0.63

In addition to the core course, the elective groups 'Public health and food control' and 'Food technology' (see Section 4.1 and Annex I) provides some students with additional teaching in food hygiene aspects.

Food hygiene teaching is spread in two disciplines 'Food Science and Technology' in the 3rd year and the 5th year subject 'Hygiene, Inspection and Food Control'. The teaching load of the food hygiene component is divided between matters of food technology (45%) and food hygiene, inspection and control (55%). If analysed by the type of teaching, food technology has a corresponding 40% and 63% of theoretical and practical hours, respectively. The overall ratio of lectures to practical work in core food hygiene subjects is 1:0.63, but just 1:0.5 as far as food hygiene, inspection and control matters are considered.

Teaching covering slaughter and meat inspection (*ante* and *post mortem* examination, transport and handling of animals, critical control points in the processing activity) is carried out in a slaughterhouse close to Zaragoza, where different food animal species (bovine, sheep, goat, pig and horse) are slaughtered. The slaughterhouse has a daily capacity of 2,000 to 3,000 small ruminants, 100 to 300 cattle and 200 to 300 swine. The average line speed is of 300 to 400 sheep/h., 40 cattle/h and 100 swine/h. By agreement with the management, carcasses rejected from the production line are available for classes with students, and can be kept in a specific cold room for later assessment.

Groups of 8 - 10 students, accompanied by one staff member, visit three times per week. Each student has 3 visits of 4 hours each. These sessions are organised in conjunction with a specific laboratory practical, 2 seminars and 2 hours of supervised work. Subjects like sampling of carcasses and surfaces and critical control points as well as control of specified risk materials and treatment and disposal of by-products, sampling for chemical residues, traceability of carcasses and offal, documentation of live animals, self-control and auditing are also addressed in the slaughterhouse sessions.

A total of 25 hours of practical activities are currently dedicated to meat inspection in slaughterhouses. In the old curriculum, students applying for the food hygiene and technology track would perform an extra period of 300 hours of extra-mural activities in slaughterhouses. This activity stems from an agreement between the Veterinary Faculty of Zaragoza and the Health and Consumer Department of the Government of Aragón. In the new curriculum, this extramural training can also be done under an agreement with the Department of Health of the Government of Aragón.

In the Special Pathological Anatomy course (see Table 4.6) 4th year students do practical training in macroscopic diagnosis with organs rejected at the slaughterhouse as well as necropsy of poultry.

Each student also carries out laboratory practice (4 hours) on meat hygiene and inspection where tests are carried out to detect traces of prohibited substances and microbiological and parasitological analysis. Apparently, there is no inter-relation of these practical activities with those performed in other departments, such as Parasitology, Microbiology or Toxicology.

Inspection of fish and fish products, dairy products, eggs and canned food are performed at the Faculty laboratories during four sessions of 4 hours each. Hygienic control in food industries is demonstrated at the Food Processing Pilot Plant in a session of 4 hours per student.

To complete practical training the Veterinary Faculty has signed 66 agreements with food companies and Food and Agriculture Councils and Health and Consumer Councils so that each student may carry out extra-mural training. At the time of the visit, no details of such training were supplied.

There is no reference to visits to wholesale/retail outlets or to catering units, nor to food processing plants other than the Faculty Food Processing Pilot Plant for compulsory practical teaching of the Food Technology Course in 3rd year (50 hours per student).

The modern and well equipped Food Processing Pilot Plant is also used for practical teaching in the optional courses 'Meat Science and Technology' (60 hours), 'Milk Science and Technology' (60 hours) and 'Fish Science and Technology' (15 hours).

The food technology discipline suitably covers meat, dairy, fish and vegetables industrial processing and control. Chemical and microbiological laboratories give adequate support for practical activities.

The 5th year subjects 'infectious diseases and 'parasitic diseases', which total 235 hours (see Table 4.6), cover formal VPH matters related to state veterinary medicine, zoonoses and public health, but this is not a structured or coordinated process. During the visit, it was mentioned by the Infectious Diseases staff that a new discipline of "Preventive Medicine and Sanitary Police" (45 hours) is due to start next year (5th year of new curriculum) but it is apparent that it will be dealing exclusively with infectious diseases issues and it will have no practical activities in the field.

There is no reference of how herd health or other preventative veterinary medicine teaching relates to food hygiene. Furthermore, it seems that an integral approach to food chain utilising and combining clinical, animal production and food safety components is not envisaged in the new curriculum.

4.5.2 Comments

The main focus of the practical training in this field is on food technology. This is probably due to the fact that a Food Processing Pilot Plant is in operation at the Faculty, facilitating access of students to the laboratories and to the processing rooms. However, students would also benefit from visits to private units.

The team was impressed by the infrastructure, equipment and activity seen in the units of Food Hygiene and Food Technology (Department of Animal Production and Food Science). It is apparent that an excellent environment is available and that the staff are motivated and performing adequately, taking in consideration the number of research projects and postgraduate students they manage to attract.

Due to circumstances (no poultry slaughterhouse is located in Aragón) poultry inspection is not presently performed, and is addressed by a video seminar and gross pathological diagnosis in the necropsy room. Such difficulties might be overcome by well-structured extra-mural activity.

In the organisation of the practical activities for the next 5th year, it will be necessary that the food safety area is considered a priority for compulsory extra-mural activities. This would give all students better exposure to field problems related to food hygiene and food control. Hands-on opportunities should be encouraged throughout the planning of such training.

It is evident to the team that a more integrated approach to production, health and safety should be pursued and implemented. All elements necessary to fulfil such objective are at hand but are not 'joined-up'. A clear definition of Faculty objectives in this area, together with an adequate coordination of resources and staff of different departments and units should be given the highest priority.

A complete rethinking of the disciplines of the next (and new) 5th year mainly concerning parasitic and infectious diseases and animal production (preventive medicine) should be implemented.

4.5.3 Suggestions

- 4.25 The balance between theoretical and practical classes in the food hygiene teaching should be improved
- 4.26 The food hygiene training should be reinforced by a compulsory component of extra-mural activity.
- 4.27 The teaching covering preventive medicine should incorporate matters related to animal production and health, as well as having a field focused approach

5. TEACHING: QUALITY AND EVALUATION

5.1 TEACHING METHODOLOGY

5.1.1 Findings

Within the general outline and requirements of the national curriculum, the teaching of each subject is decided separately by the staff responsible. An outline of the content of the course is sent annually to Teaching and Curriculum Committee to coordinate the curriculum.

Teaching is presented in a traditional way using lectures, practical work, clinical work, excursions, etc. (see Section 4.1 in relation to the composition). As noted in Section 4.1, the course is heavily based on lectures, with a need for a greater component of practical work and active learning. Problem-based learning is not used, although much of the supervised work and the computer-based learning adopt a problem-oriented approach.

Most of the teachers know the difference between practical, hands-on work, and supervised work, but there is confusion on these two aspects for a few of them. In some cases 'practical work' includes videos to large groups and other sessions that are more theoretical in character.

For learning materials, course scripts, notes, in-house and standard textbooks, research journals and electronic media are available.

The level of material support for teaching, such as audio-visual equipment, availability of computers, and access to rooms for self-study, is good.

The University of Zaragoza has a system for the assessment and control of teaching which is used in all faculties and departments. Students annually complete questionnaires rating different aspects of teaching for each subject and the teachers concerned. The questions on the subject cover aspects such as the definition of the objectives, difficulty, range of the programme, importance of contents, usefulness of resources recommended, conditions and facilities for theoretical and practical classes. The questions on the teaching staff have 4 sections:

- Attendance and punctuality;
- The teacher's knowledge of the subject taught;
- Class preparation, teaching methodology and efficiency in communicating knowledge;
- Student-teacher relations; - the extent to which teachers encourage participation and create interest in the subject, how available they are for tutorials, questions, etc.

The questionnaires are processed by the University, with each teacher receiving their own results. The Teaching and Assessment Commission of the Veterinary Faculty analyses the results of the questionnaires and prepares a general report. It also analyses the results for each teacher individually and, where necessary, requests any extra training it feels is needed. The general annual teaching assessment and the teachers' assessment reports are sent out every year from the centres to the University Teaching Commission.

Students and staff can also independently make suggestions or comments to the Teaching Commission.

5.1.2 Comments

The comments made on the curriculum in Chapter 4 will have a considerable bearing on the teaching methods, in particular the need to integrate the teaching, ensure it has a clear orientation towards professional activity and subsequent training, and increase the proportion of work of a practical nature and self-directed learning.

It is good that there is an evaluation system. Students agree that the questionnaires are straightforward to fill, but do not all complete them. Some sections and questions of the questionnaire are also of a very general nature, since the survey has been devised to cover all subjects and teaching at the University.

The evaluation and structure and aims of teaching would be considerably improved by building in

feedback from veterinary graduates. This would include both collecting information from recently graduated students on how the teaching could better equip them for professional activity, and including practitioners in discussion of the learning objectives in different subjects from an end-user perspective.

5.1.3 Suggestions

- 5.1 The Faculty should seek to improve the relevance of the evaluation questionnaire to veterinary studies by consulting with teachers, students and graduates. It should also seek to improve the participation rate of the students by requiring all the class to complete questionnaires.

The suggestions made in relation to the curriculum (e.g. on integration, mix of practical, theoretical and supervised work, etc.), in particular those in Section 4.1, will have a considerable influence on the teaching approach and methodology.

5.2 EXAMINATIONS

5.2.1 Findings

Each subject in the curriculum is assessed separately using an examination prepared and implemented by the department or member of staff responsible for its teaching. The Vice Chancellor's board gives general guidelines in relation to examinations. External examiners are not used.

There are three teaching-free periods for examinations, at the end of January/early February, in June to mid 15th July, and in the first few weeks of September.

A student or staff member may request that the examination is carried out by a committee established by the Dean on the Department's proposal. Such tribunals are made up of three teachers and a substitute in the corresponding area of knowledge for the subject.

The number of times per year a student can sit any given exam has recently been reduced from 3 to 2. Under Spanish law, a student is allowed a maximum of six retakes of each examination, after which they are dismissed from the course. Attendance at an examination session is not mandatory i.e. a 'no show' is not considered as a failure. There is no time limit to taking examinations.

1st year students who do not pass a minimum of one subject in the year will not be able to register for the subjects of the following year. With the new syllabus students must have also have passed a minimum of 75% the compulsory course credits of the 1st cycle in order to enter the 2nd cycle (3rd year). In order to start the 4th year, 90% of the compulsory credits from the first cycle must have been acquired.

5.2.2 Comments

The current system of teaching and examinations forms a rather 'closed' cycle, since there is often a lack of input from outside the specific discipline (see also Section 4.1). Each subject is an island, and there is a need to encourage or require students to demonstrate an understanding of how one discipline is linked or applied to another. This is essential to learning in several subject areas (e.g. farm animal health and productivity), where an understanding of the interrelationship of closely-related topics is required to function effectively as a veterinarian.

The structure and logical progression that one would expect to find in a veterinary study programme is impeded by the absence of prerequisites, and allowing students to retake each examination many times. A staff member cannot know whether a student has acquired a satisfactory level of competency in a related discipline, upon which they can base their own teaching programme.

5.2.3 Suggestions

- 5.2 Students should have to pass the examinations in prerequisite subjects before being permitted to enrol for more advanced subjects. Students should also not be permitted to start a further 'cycle' of the curriculum unless they have successfully completed at least 80% -90% of all the subjects and the examinations of the preceding cycle.
- 5.3 There should be mechanisms and safeguards to objectively assess the level reached in a subject, such as external examiners who can independently assess written material and repeats of oral examinations.
- 5.4 There should be a system to externally and objectively assess whether the content of a subject and its teaching is relevant, comprehensive and well-matched to the priorities of subsequent studies or professional activity. For the applied subjects (such as clinical training, animal production and veterinary public health), practitioners should be included in this process.

6. PHYSICAL FACILITIES AND EQUIPMENT

6.1 GENERAL ASPECTS

6.1.1 Findings

The Faculty of Veterinary Medicine is situated on the 'Miguel Servet' Campus, about 4 km from the Central University, with a total area of about 80,000 m². Fronting the road are the three original harmoniously-styled FVMZ buildings, dating from around the middle of the 20th century:

- The Central Building, which houses several teaching areas (physics, chemistry, mathematics, physiology, genetics, biochemistry, pharmacology, toxicology, microbiology, philology), the Dean's office and administrative and central services;
- The Zootechnics and Food Science Building, housing the classrooms, laboratories and offices of anatomy and embryology, food and nutrition, food hygiene and inspection, food technology, agriculture and animal production;
- The former clinical building, currently being renovated, housing a computer room, the Regional Spongiform Encephalopathy Laboratory and the maintenance service.

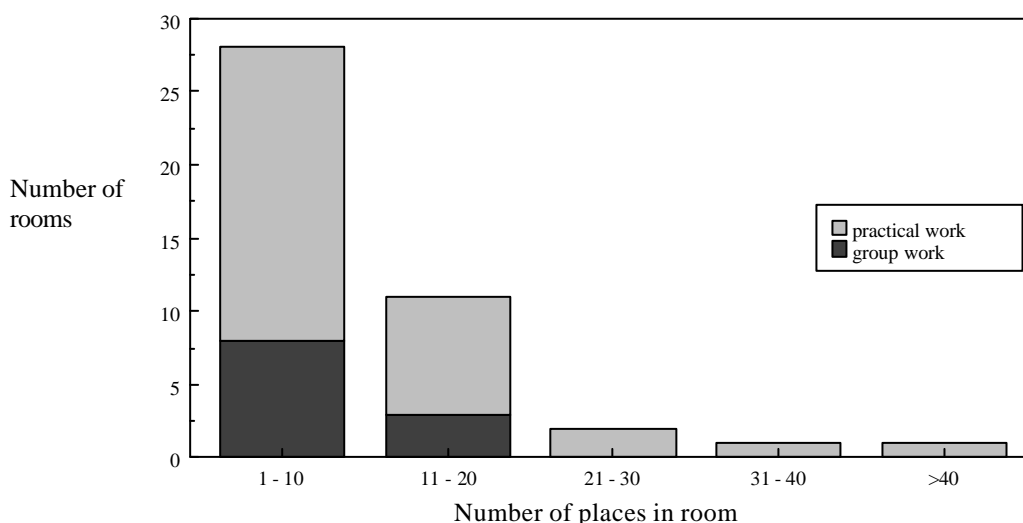
To the side of these is the new Food Processing Pilot Plant. Behind the original buildings are various other new facilities, principally:

- The new Veterinary Teaching Hospital (VTH) of about 7,500 m². The small animal and large animal clinics (see following section) and different meeting rooms are on the ground floor. On the first floor there are teaching and specialised laboratories, a study room with computer facilities and a self-access language study room. The second floor is administrative and office space;
- A teaching block with 4 classrooms, 2 computer rooms, the autopsy room, library, staff room and cafeteria;
- a complex of new renovated building of about 10,000 m² housing the Animal Experiment Support Service (AESS) of the University;

Overall the FVMZ has 16 lecture halls with about 2,250 places, including four with capacity for 240 people, and one with 336 seats. The lecture halls are well equipped with video beamers and connected to the intranet and internet.

Each department or unit has their own laboratories for practical teaching and for research (see Figure 6.1). The laboratories are adequately equipped.

Figure 6.1: Distribution of rooms for practical and group work



The provision of library and computing facilities is outlined in Chapter 8.

There is a 'teaching farm' on the campus (see chapter 7), run by AESS, which also has three examination

rooms.

The premises used for teaching food hygiene and technology have been outlined in Section 4.5.

6.1.2 Comments

The Faculty is well-sited for access to both small animal material from the town and for farm animals, since Zaragoza is in a region of high agricultural production. The Campus is relatively built up, with limited potential for further expansion.

The facilities of the Faculty are generally spacious and well-equipped. Several buildings are newly constructed or recently renovated, and provide good facilities (e.g. VTH, Food Processing Pilot Plant). The older buildings are showing their age, and need renovation.

There are very few facilities that are not departmental 'territory'. Practical work is carried out in a large number of separate small facilities, requiring a lot of repeats. It would be useful and efficient to have some larger shared teaching laboratories (e.g. chemistry/biochemistry 'wet' labs, microscopy facilities, etc.) with a higher capacity.

As remarked in Section 4.1 and Chapter 10, repeating lectures is of little or no added learning value. The FVMZ appears to have theatres with enough capacity for the annual intake at one sitting.

The clinical premises have been commented on in the following section.

The 'Faculty Farm' is not a working farm, and the teaching access and use of the animals is limited either by their ongoing primary use in experimentation, or gives rise to welfare concerns (e.g. number of rectal examinations per animal). More remarks on access to material for production animal work have been made elsewhere in this report, but centre on making greater use of commercial farms.

6.1.3 Suggestions

- 6.1 The ongoing programme of renovation should be continued, to progressively refurbish the older buildings on the site.
- 6.2 The Faculty should aim to establish larger practical teaching laboratories for use by several departments, to facilitate a reduction in the number of repeats of each session.

6.2 CLINICAL FACILITIES AND ORGANISATION

6.2.1 Findings

Small animal and equine clinical facilities and services are provided in the new Veterinary Teaching Hospital, which is divided in small animal clinic of about 2,000 m², and an equine clinic and stables of about 1,600 m².

The small animal clinic has a reception, administration area and pharmacy giving onto a corridor along which are 9 examination rooms. At the far side of these rooms is another corridor with access to the radiology and surgical area, with 4 operating theatres and ICU and hospitalisation facilities.

The equine hospital comprises a reception and examination hall, with access to stables and the surgery area. The latter has two operating theatres and 3 anaesthesia boxes, along with preparation facilities. Outside there are some paddocks.

There are basic facilities for farm animals elsewhere on the Campus. As remarked in Section 4.4, production animal clinical cases are predominantly those seen during the mobile activities of the private practitioners hired as adjunct professors.

Table 6.1: Hospitalisation and isolation places available

	cattle	horses	small ruminants	swine	dogs	cats	isolation	
							small animals	large animals
Teaching hospital	0	7	3	3	15	10	5	0
Animal Experiment Support Service	14	5	50				5	2

Clinical services are provided under the umbrella of the Veterinary Teaching Hospital, which is organisationally separate from the Faculty and its departments, and depends directly on the University. Many, but not all, of the clinical academic staff of the Department of Veterinary Medicine (sections of surgery, internal medicine and reproduction) are involved in the clinical activities. The VTH also runs some clinical posts from its own budget, in particular those on the 2-year residency/internship programme (see Chapter 12).

The small animal VTH is open all year round, with routine procedures from 10:00 – 17:00 weekdays. Emergency services, hospitalisation and intensive care run 24/7.

The equine hospital is open 24 h /day, with a predominantly referral service provided by one veterinary surgeon. Other staff from surgery help out as required, and 5 residents (see Chapter 12) and 10 undergraduate internal students cover the gaps and assist with equine work.

In both the small animal and the equine areas, practitioners can bring a clients animal along for treatment using the VTH facilities. In the small animal area, they have a special price of 20% less than they charge the owner. This charging structure is also used for equine work, but in instances where a client is brought in primarily for teaching purposes, only consumables are charged.

The Faculty has various diagnostic and clinical support services:

- Diagnostic laboratory for infectious diseases
- Ichthyopathology Laboratory
- Microbiology and serology Laboratory
- Anatomopathological diagnosis laboratory
- Diagnostic Laboratory for wild animals
- National reference centre for animal spongiform encephalopathies
- Spongiform Encephalopathies Regional Diagnostic Laboratory
- Biochemical genetics laboratory
- Epidemiology and biostatistics service.
- Pig advisory and diagnostic service
- Dermatological veterinary diagnostic service
- Radioisotope service

Mobile activities are provided by several private practitioners who are contracted as adjunct professors (see also Section 4.4 and Chapter 10). These both take students along when they are seeing clients, and bring material into the FVM clinics for treatment (especially equine).

6.2.2 Comments

The new teaching hospital has hugely improved the possibilities for student training. The facilities and provision for small animal work in the VTH are generally satisfactory. The activities of the main clinical sections dealing with small animals seem to be well integrated, but there are difficulties in achieving fuller participation of the paraclinical sections (e.g. parasitology and infectious diseases) in applied clinical aspects, such as consultations, teaching and diagnostic work.

The team was pleased to see that enormous progress has been made recently in equine work, but would note that the Faculty needs to consolidate and continue progress in this area. The internal medicine section does not seem to be actively involved in the work of the equine clinic. The equine clinic depends very heavily on a single specifically equine surgeon, who has an excessive workload. This is a huge risk for the FVMZ.

The Faculty needs to reinforce the staffing in the equine field, both by increasing the number of staff specifically working in the equine clinical area, as well through the more active involvement of the discipline-based sections (i.e. internal medicine, surgery, reproduction, etc. becoming involved in the equine clinic). The Faculty could also consider the idea of buying into an equine practice, and/or replacing several associate professors with 2 – 3 permanent equine positions.

The equine premises have not been well designed for their intended purpose. Some defects are immediately obvious, with several having a direct impact on clinical work and patient health:

- the anaesthesia boxes are too small, with constrained exits for personnel;
- there are an excessive number of anaesthesia induction boxes;
- the overhead rail for moving fallen horses, does not go in/out of the boxes, which is where horses tend to collapse, rather than the corridors;
- the isolation facilities are not readily accessible to the equine clinic, and seem to be part of the experimental animal unit;
- the very large operating theatre only has a small drain;
- there is no ventilation in the stable block.

The Faculty and hospital staff are aware of the needs to adapt the equine facilities.

An increasingly large percentage of the equine material involves referred lameness investigations. However, there is nowhere to trot them except on the road. The paddocks, which should have one hard surface and one soft surface, are totally unsuitable (hazardous) as they are peppered with large stones. Diagnosis in these circumstances is both difficult and dangerous for the horses. Curing the problem is a straightforward matter of picking the stones out.

The equine case load is likely to increase further, since the Faculty has equipment that is not generally available in the area. This is very positive, but it means that the equine clinic must ensure it has suitable basic facilities and amenities, such as paddocks and trot-up areas.

As remarked in Section 4.4, the organisation of production animal clinical activities and teaching gives rise to concerns. The academic staff working with production animals do not seem to be meaningfully engaged with actual cases or farm animal health work that would form the basis of veterinary work in this area. Instead, the clinical services and teaching depend heavily on what the part-time adjunct professors have available on a day-to-day basis (i.e. akin to seeing practice). Activities are not well coordinated, with no evident formal liaison between clinical work and the departments of Reproduction, Parasitology and Internal Medicine. The clinical buildings for farm animals are unsatisfactory.

The Faculty must have a viable farm animal activity on which to base its academic teaching. As outlined in Section 4.4, the main route for achieving this should be for the FVMZ to develop - or buy out - a

production animal mobile practice. For instance, the resources used to pay several associate professors could be used to either:

- hire on a permanent basis three practitioners (1 bovine, 1 ovine, 1 swine) and by sharing three farms covering these species, or/and;
- become a partner in or buy out a farm animal or mixed practice and make an agreement with several producers so that students are allowed to perform clinical techniques on the animals; or

These activities should encompass animal health and productivity work (i.e. the structured on-farm work mentioned earlier), as well as reactive single-animal treatment. Farms in which the University/Faculty is actively involved in managing, and which are run in an efficient way could set a standard for practitioners in the area, as well as being a good example for local farmers.

6.2.3 Suggestions

- 6.3 The FVMZ should establish a Faculty-run production animal mobile health service that includes a systematic herd-health advisory service as well as single animal clinical work.

Suggestion 4.14 relates to the need to improve the activities in the production animal area. This is primarily due to concerns about the teaching programme, but has major implications for the structure of farm animal clinical activities at the FVMZ *per se*.

- 6.4 The number of clinicians providing clinical services in the equine hospital should be increased, including through the full participation of all discipline-based sections in equine clinical services.
- 6.5 The design errors and other drawbacks in the equine facilities should be remedied as soon as possible.
- 6.6 The section of parasitology and infectious diseases should have greater involvement in clinical activities in terms of being consulted on cases in their fields, and providing a dependable diagnostic service to the Hospital

Suggestion 10.2 relates to the need for all of the academic staff working in clinical sections to be actively and fully involved in providing clinical services.

7. ANIMALS AND TEACHING MATERIAL OF ANIMAL ORIGIN

7.1 Findings

A wide range of methods are used for teaching anatomy from traditional skeletons, bones and entrails preserved in formaldehyde, dissection of dogs, sheep and hens to on-line three-dimensional shows on computer. Animals for dissection come from the town dog pound and are cats and dogs euthanised for humane reasons. Sheep come from farms. By-products from the slaughterhouse, such as limbs from horses and cattle are also used.

Each student performs necropsies under supervision during one week, and attends to 35 case reports during the 3rd year.

The animal material seen in the establishment clinics is detailed in Table 7.1.

Table 7.1: Number of animals seen in FVMZ clinical work (2003 – 2005)

		consultations			hospitalisations			autopsies		
		2005	2004	2003	2005	2004	2003	2005	2004	2003
Farm animals	Cattle	818	736	662	3			49	46	74
	Horses	825	618	600	180	15	13	32	13	24
	Small ruminants	2855	2569	2312				947	692	1074
	Pigs	2982	2684	2416	2			57	62	106
	Other farm animals							164	178	322
Pets	Dogs	6297	6181	5548	732	718	311	174	173	227
	Cats	870	838	798	160	152	60	13	15	34
	Other pets	204	102	57	4	5	4	9	9	3

The new Veterinary Teaching Hospital has significantly increased the caseload.

The Faculty does not own its own farm or make first opinion farm animal practice. The organisation of the farm animals for on-site teaching is done by the Animal Experimental Support Service (AESS) of Zaragoza University at the request of the staff of Internal Medicine and Surgery. At the time of the visit 4 horses (2 mares and 2 geldings), 3 cows, 3 goats, 2 dogs and about 30 sheep were kept by the AESS for teaching. The AESS keeps other animals on the Faculty campus, which it may be possible to use for teaching, depending on the subject and the content of the research projects they are in. There is also an experimental barn with 4,000 broilers and for 1,500 laying hens (although this was empty at the time of visit) which can be used for teaching purpose.

Access to clinical cases in large animals is provided through the mobile work of adjunct professors, hired for this purpose who take students with them to visit their own customers' farms when they are called. Within the clinical area, the FVMZ has adjunct teachers for horses (4), pigs (2), and 1 each for sheep, cattle and exotics/wild animals. This gives the Faculty access to a number of farms covering the different species, including horses.

The ratio of students graduating:clinical caseload in pets is about 1:5.1 (145:7371).

The ratio of students graduating:clinical caseload in livestock is 1:52 (145:7580). However, core hands-on practical work with livestock is limited to two or three farm visits during the 4th or 5th year (see Section 4.3 and 4.4).

The ratio of students graduating:necropsies is about 1:8.8 (145:1272). For reasons of comparability between reports, necropsies on 'other' farm or pet animals (such as poultry, rats and rabbits) are not included when calculating the ratios.

7.2 Comments

There is adequate fresh, chilled and/or prepared material available for teaching anatomy. The students can perform dissections themselves.

The quantity of material available for necropsy is adequate and balanced, although somewhat short in

bovine work. Whilst the number of necropsies declined by nearly 20 % over the last two years, it is still sufficient. However, the Faculty must ensure that the number of necropsies in farm animals does not decrease further.

The new Hospital has considerably increased the caseload and reputation of the Faculty. The quantity of small animal material seen in the Faculty is sufficient to provide adequate clinical experience to students.

Although numerically the caseload of large animals including horses is adequate, the dissociation of the on-site teaching and demonstrations by the permanent academic staff from the off-site, case-based training by hired private practitioners is a major concern (see Sections 4.3 and 4.4).

The large animals available for the on-site teaching of basic techniques are totally inadequate for the numbers of students who will need to participate in tasks such as rectal examinations. This raises welfare questions about the repeated use of teaching animals. As a teaching establishment, the FVM needs to ensure that good welfare standards are maintained as regards the premises, keeping and use of animals in teaching.

There is also the problem that the on-site teaching is not based on cases, but on healthy and 'normal' animals. For example, students of 4th and 5th year reported that they only palpated once or twice a cow or a mare, none of them were pregnant. In effect, during the on-site farm animal teaching, students do not have access to cases.

7.3 Suggestions

The suggestions concerning undergraduate exposure to animals relate mainly to :

- The amount of practical and clinical work in the course (see Suggestion 4.4 – 4.6);
- A lack of structure and coordination to the production animal teaching (see Suggestion 4.14);
- A need to develop some clinical activities (see Suggestion 6.3 and 6.4).

8. LIBRARY AND EDUCATIONAL RESOURCES

8.1 Findings

The Faculty Library is administratively a component of the University Library, and occupies about 850 m² of space in the teaching block.

The Library has 8 full-time employees and an operating budget of about 170,000 €. It is open from 08:30 – 21:30 on weekdays during term time, and 09:10 – 13:30 on Saturday. During vacations, the Library is open from 08:30 – 14:00 on weekdays. The Library subscribes to about 270 journals and purchases 1,200 – 1,300 textbooks annually.

There are 21 subsidiary libraries situated in and run by the various departments and sections of the Faculty.

The computer services also depend on the University, although the resources are based on the Veterinary Faculty Campus. The FVM computer services are supported by one full-time employee and a final-year student 'intern'. There are 109 computers scattered in clusters of 8 – 15 in different rooms and buildings of the Campus, over 90% of which are over 3 years old:

- 4 computer rooms for teaching;
- 1 computer room for self-study of English;
- 4 computers for Internet and database searches in the Library;
- 2 computer rooms of 15 units each for student use; and
- 13 Macintosh computers without internet connection available for students' own use in a room that has broadly similar opening hours to the main Library.

For structured work with computers, students use the facilities at the Statistics Centre of the University, on the city Campus.

8.2 Comments

The Faculty Library is generally satisfactory in terms of its staffing, facilities and stock. The students would seem to want the Library to be open later in the evening, and during weekends, although the currently stated opening hours seem quite generous.

There are a very large number of departmental libraries, without dedicated staff, which are not realistically able to support the normal educational or research functions of such facilities. It would be better to concentrate resources into the main Library. An exception would be to maintain one a near-clinic (VTH) library both for quick and easy reference, and for students and postgraduates to use for study during quieter periods of duty.

There is no adequate computer room either for teaching on the Veterinary Faculty Campus, or for the students' own use. Computing resources are scattered over the buildings, and are in any case not sufficiently up to date or 'enabled' (e.g. connected to the Internet) for practical use. Computers are now an integral part of a working veterinarian's life, both in terms of their professional use (e.g. finding and updating knowledge, analysis of data) and for general support work (e.g. accounts, administration, communication). There needs to be adequate provision of computing resources at the Faculty site for both structured teaching and for students' self-directed or elective activity.

8.3 Suggestions

- 8.1 The departmental libraries should for the most part be subsumed into the main Faculty Library.
- 8.2 There should be adequate provision of up-to-date computers for use in both the structured teaching and for students' self-directed work and general use.

9. ADMISSION AND ENROLMENT

9.1 Findings

High school studies have four different branches, each one permitting access to a set of university-level studies. A student who wishes to enrol on a veterinary course should have followed the 'Biomedical' branch, which includes biology and chemistry.

The main route of admission to university level studies is a competitive general entrance test at the end of high school studies. The total mark of a student is based 60% of the average grades from high school, and 40% on their performance in the entrance test. The qualification needed to attend the Veterinary Faculty is amongst the highest the region.

The student intake is limited by a *numerus clausus*. The figure for this is figure proposed by the Veterinary Faculty, but has to be approved firstly by the University Co-ordination Council and ultimately by the Spanish University Council. The student intake has been reduced from around 250 in 1994 to about 155 at present, which is close to the figure suggested in the previous evaluation. The Faculty remarks that it is not likely that the admission will change from the current levels.

Year	2004/05	2003/04	2002/03	2001/02	2000/01	1999/00
Number applying	450	497	514	579	510	485
Number admitted - standard intake	155	166	189	172	167	167
- transfers	8	1	3	3	6	3
Number graduated		145	154	144	157	133

A total of 1064 undergraduates are enrolled on the veterinary course, about ¾ of whom are female.

Around 1,300 students graduate annually from Spanish veterinary faculties.

The Ministry of Science and Education offers a number of grants for all types of students and universities. The student makes his/her request and the grant is given based on his/her academic results and family economic status. For the year 2004/05, 144 students received grants.

The effect of examinations on progress through the course is outlined in Section 5.2.

9.2 Comments

The admission process results in students who have the knowledge base in biology for veterinary studies. Nonetheless, it seems that the level of students' knowledge of physics and mathematics is highly variable, requiring a foundation course in these disciplines. It would be desirable to make an adequate level of knowledge in these subjects a prerequisite for veterinary studies. It is noted that this is not easy to achieve with the national university entrance examination.

The drop-out rate is low relative to other courses. However, it is unclear whether the entrance process is admitting students from a wide range of backgrounds and with a broad interest in all fields of veterinary work. There is some evidence that many students have very little motivation for production animal studies and practical husbandry.

The Faculty and University should be congratulated on reducing intake to the suggested level without cuts to staff and facilities. The decrease in the number of admitted students to a more manageable level has been a key factor in enabling the FVMZ to improve the quality of teaching, in particular as regards practical work. The level of student intake is in general compatible with the staff resources, facilities and budget available for teaching them. However, it must be noted that the expansion needed in clinical training (see Sections 4.1 and 4.4) will be demanding of manpower.

In a more general context, there appears also to be overproduction of veterinary graduates within Spain. Although most graduates from the FVMZ find employment, this is sometimes in low-paid work in the area, or by moving elsewhere.

9.3 Suggestions

- 9.1 Students starting the veterinary course should already be equipped with an adequate level of knowledge in the basic science subjects (biology, chemistry, mathematics and physics).

10. ACADEMIC AND SUPPORT STAFF

10.1 Findings

The staffing of the FVM are organised within four Faculty-based departments and sections of another seven departments based in other faculties (see also Chapter 2). The staff positions in each department are shown in Table 10.1.

Table 10.1: Academic and support posts at the FVMZ

Department or service	Academic staff *						Support staff			total
	Prof.	Lect.		Assist. Prof.	Assoc. Prof.	Post-docs	tech./anim. teaching	carers res.	admin./general	
<i>Faculty departments</i>										
Agriculture & agrarian economy		9		1	0.75		1		1	12.75
Anatomy, embryology & genetics	2	13		3	1	7	2	11.5	1	39.5
Veterinary medicine	8	43		4	5.75	6	9	4	2	81.75
Animal production & food sciences	4	28		2	3.75	21	5	7.6	2	73.35
<i>Sections from external departments</i>										
Pathological anatomy, legal medicine & toxicology		4				4	1			9
Biochemistry & molecular & cellular biology	2	4				9	1	1.6	1	18.6
Pharmacology & physiology		9		1		2	2	0.6		14.6
Applied physics		2								2
Applied mathematics		1		1	0.75					2.75
Analytical chemistry		3		1	1					5
English and German Philology		3								3
<i>University and central services</i>										
Veterinary Teaching Hospital							6		2	8
Food Processing Pilot Plant							3			3
SAEA (Experimental Animals)							22			22
Library									8	8
Central administration									11	11
Porter's lodge									10	10
Reprography									3	3
Specialised services									8	8
TSE laboratories								12		12
External Training					5.6					5.6
TOTAL	16	119		13	17.6	49	52	37.3	49	352.9

(* an Emeritus professor is not included)

The associate professors ('*asocidos*') are private practitioners (who may also have been referred to as 'contracted') who support in particular the applied part of the teaching, especially production animal and equine work (see also Section 4.4 and 6.2).

The ratio of teaching staff:students is about 1: 5.0 (214.6: 1064) or 1: 6.4 (165.6: 1046) if post docs are not included.

The ratio of teaching staff:support staff is about 1: 0.57 (214.6: 138.3) or 1: 0.84 (165.6:138.3) if post docs are not included.

The Department is the body that has the right to request new academic positions and selects staff. There are two types of academic staff: tenured and contracted, each recruited in a different way. Both are budgeted permanent positions financed by the University.

Non-permanent positions for contracted teachers can either be funded through University or by research projects. The later is often used to contract support staff . The contracted positions were mainly for young teachers and part-time staff. Spanish Universities are currently in a process of change that will probably favour employing teaching and research staff on a contract basis.

Student numbers are the primary influence on staffing numbers. To open promotions or new positions, each university makes a proposal to the Ministry of Education about the number and characteristics (knowledge area) of the posts needed. A national competition for the posts requested by different Spanish universities is held, leading to a list of approved candidates. The top candidates can then apply for vacant positions.

Once qualifying and appointed to a 'knowledge area', academic staff remain within that area or one very closely related, unless they re-qualify for entry to a different one. As remarked in Chapter 4, teaching of particular disciplines is allocated specifically and exclusively to an individual knowledge area.

The Veterinary Teaching Hospital is organisationally separate from the Faculty (see Chapter 2). Many, but not all, of the academic staff from the clinical sections of the FVM departments participate in the clinical activities of the VTH (academic staff contracts specify teaching and research duties, but not clinical work). The VTH management has flexibility in the appointment of its 'own' personnel from the external income according to the needs of the hospital services.

The evaluation process for staff is indicated in Section 5.2.

10.2 Comments

The ratio of teaching staff:students is satisfactory. The ratio of teaching staff:support staff is unsatisfactory, and needs to be given some consideration.

There is a sufficient overall 'critical mass' of staff to cover all the disciplines necessary for veterinary training. However, as remarked in Chapters 2 and 4, academic activities are very clearly delineated and oriented towards 'knowledge areas'. This compartmentalisation reduces the effectiveness with which staff are deployed and the delivery of teaching. There are particular concerns about coverage in fields and topics where an interdisciplinary approach is necessary, or are simply less traditional

The weaknesses this brings to the staff structure and effectiveness of activity mirror those of the curriculum:

- Over-representation in some areas, in particular zootechnical fields, compared with the distribution of posts in veterinary faculties in many EU countries;
- Little cross-fertilisation between areas that should have strong interdisciplinary linkage;
- Weakness in areas falling between or outside specific knowledge areas (e.g. welfare);
- Knowledge areas and their staff not necessarily being oriented towards applied veterinary activities and responsibilities.

Remedying these weaknesses will entail a systematic and long-term programme of change of structures and attitudes. As mentioned elsewhere, a clear central 'veterinary' direction and management would provide more balance and an overall structure to activities carried out within the FVMZ.

The significant increase in teaching that is essential in the clinical field (see Section 4.1) will require a reinforcement of the clinical teaching manpower. In this respect, it should be noted that clinical service is *sine qua non* obligation of academic staff working in the clinical field. An individual cannot credibly maintain clinical competency, teach, or claim to carry out research in a clinical field if they are not actively engaged in clinical work.

In terms of manpower, the active engagement of all academic clinical staff in clinical services is also essential for maintaining the level of clinical work, and for providing a minimum level of undergraduate training. The clinical areas are also the ones that are most demanding of staff time, both in terms of the intensive case-based teaching that is required, and the need for the Faculty to offer dependable clinical services to bring in the clients it needs for its teaching. In short, the clinics of a veterinary teaching establishment need all the academic staff of the clinical departments to be committed to working there.

The FVMZ makes extensive use of private practitioners as 'adjunct professors'. These individuals make a valuable contribution, in particular in the farm animal field. However, two major concerns arise;

- Firstly the academic staff of the Faculty seem to have almost no involvement in farm animal health, clinical work or applied production aspects.

- Secondly, there is insufficient linkage between the work of the associate professors and the curriculum as a whole.

However effective, ‘adjunct professors’ cannot and should not be expected to compensate for an absence of Faculty farm animal work and a firmly directed Faculty training programme in this area.

The academic staffing structure comprises a large number of middle-ranking posts, with few junior or senior positions. There seem to be difficulties in achieving promotion to full professorial positions. There were also remarks about the precariousness of some contracts of the associate professors making the educational potential of the staff not fully exploited.

Although eligibility for an academic appointment is based on a national competition, it was very noticeable that a high proportion of the FVMZ staff also trained at the Faculty. It would be beneficial to have staff from a wider range of backgrounds, to avoid ‘inbreeding’.

Staff mobility is very constrained by the system of fixed ‘knowledge areas’, since an individual appointed to one area cannot readily move to or work in another. In effect, once appointed to a ‘knowledge area’ staff are no longer polyvalent veterinarians, but ‘anatomists’, ‘pharmacologists’, ‘food scientists’, etc. for the rest of their academic life, unless they re-qualify in a different area.

10.3 Suggestions

- 10.1 There should be a systematic and long-term programme to change the staffing structure and organisation of the Faculty to reflect the overall needs of sound veterinary teaching, in particular:
 - A rebalanced distribution of staff that reflects the working areas of veterinary graduates and the teaching required (see Suggestion 4.3) to produce graduates with the basic knowledge and skills for such professional activity;
 - A clear academic orientation and affiliation to veterinary medicine and science, along with a good awareness of applied professional activity;
 - Establishing strong interdisciplinary links between different sections and departments, and reinforcing areas where there are knowledge gaps.
- 10.2 All academic staff who are in a clinical section should have active and structured involvement in the clinical services of the VTH and in off-site work if they are work in the farm animal and/or animal production area.

Suggestion 4.14 is concerned with the pressing need to change the teaching programme as regards farm animal health, and has substantial implications for the working patterns and interaction of staff.
- 10.3 The Faculty and University authorities should encourage, or require, greater mobility and interaction of staff;
 - Between knowledge areas in the same Faculty, where cross-fertilisation and an outside perspective would be valuable;
 - To and from other veterinary faculties within Spain, and preferably from beyond;
- 10.4 The FVMZ and University should aim to establish a more balanced (pyramidal) staffing structure, with fewer intermediate positions and clear promotion paths.

11. CONTINUING EDUCATION

11.1 Findings

Continuing professional education (CPE) is not an objective of the Faculty, and there is no FVMZ structure for organising such activities.

Table 11.1: Courses organised by the FVMZ in 2004

Title of course	number of participants	total number of hours
New rural life in Latin America	30	80
XVII symposium on cooperatives and rural development	90	40
Cellular separation and sub-cellular fractions	17	30
Course in veterinary medicines, medicinal fodder	20-25	12
Homeopathy and therapeutics for vets	49	12
Course in sheep pathology	32	14-19 june
Informative conferences	variable	last Thursday in each month

Table 11.2: Courses organised at FVMZ by outside bodies in 2004

Title of course	number of participants	total number of hours
Determining factors in the learning of University students and teaching competence of the teacher		4
Veterinary Cytogenesis	8	40
Course in Molecular Genetics: Genetics on the verge of the XXI century	150	25 (3 h genetics)
Inaugural lesson of the 2004/05 year of the Diabetics Association of Zaragoza	75	2
Cycle of conferences in the Aljafería	70	2
Training course for Keepers of Experiment animals. A1 Category	20	30
Pig anaesthetics workshop	120	16
Medicine waste remains	40	4
Course in "Filemaker Pro as a teaching and research resource"	25	20
Advanced Multimedia presentations for teaching and research with Powerpoint	20*3=60	16
"Anatomopathologic Diagnosis in Pigs" (II AVPA Congress)	30	3
Technical AVPA Meeting "Pork production costs" Monographic Conference	180	4
Conference "Biotechnology in Reproduction"	40	20
II AVPA Congress	170	11
Picture taking in digital format and treatment with Adobe Photoshop	20	20

Participants are new graduates and experienced practitioners wishing to learn new skills (e.g. laparoscopy) or refreshers (e.g. pig anaesthesia).

11.2 Comments

There is a demand from outside the Faculty for extra CPE, which will increase as lifelong learning becomes a reality (i.e. a professional obligation). Offering CPE is in any case a useful way to build up relationships with practitioners, to keep them aware of the competencies and support available at a veterinary teaching establishment, and also to get feedback on their needs and concerns.

The Faculty could readily improve its activity in this field. Working together with the local veterinary associations, it could plan appropriate courses, which would improve relations and feedback with veterinarians working outside the Faculty.

It would be beneficial to have structured Faculty involvement in CPE planning, so that this is not solely based on *ad hoc* offerings by departments or individual staff who have an interest in a particular field. It could be questioned, for example, whether it is appropriate or wise for a veterinary training and research establishment to be associated with presenting homeopathy as if it were a valid treatment.

11.3 Suggestions

- 11.1 In collaboration with the local veterinary organisations, the Faculty should take a leading role in organising or facilitating continuing professional education in the region.

12. POSTGRADUATE EDUCATION

12.1 Findings

There are 162 registered postgraduate students at the Faculty, 98 from Spain, 12 from other EU states and 52 from non-EU countries.

In 2003/04 academic year, a total of 59 Diplomas were awarded in further studies in the different Departments of the FVMZ, of which 25 were awarded to veterinary. In the same year, 37 doctoral theses were defended, 18 of which were presented by veterinary graduates.

Postgraduate Research Training

The FVMZ offers or participates in various taught diploma and Masters courses.

Table 12.1: Taught postgraduate courses

	duration of training	number enrolled	
		full time	part time
Diploma level courses			
Food anthropology: food, health, technology and society ¹	260 h.	25	
Online course in Ophthalmology	60 h.	25	
Anaesthetics and Intensive Care	30 h.	20	
Practical training in laparoscopic surgery	24 h.	6	
Specialist diploma in hotel and catering (D.U.E.R.H)	320 h.	20	
Practical training in end urological surgery.	16 h.	6	
Masters level courses			
Top management in food and agriculture companies of the Ebro Valley. ²	600 h.	25	
Veterinary acupuncture	520 h.	25	
Minimally invasive interventionist techniques guided by biomedical sciences	570 h.	20	

¹ various Universities and research centres in Spain and overseas participate in this course.

² Organised by three universities (Zaragoza, Navarra and La Rioja), each responsible for one year of the course.

Ph.D. studies are a departmental responsibility. There are seven Ph.D. programmes (see Table 12.2) running at the Faculty, organised and supervised by its five Departments. The Ph.D. programmes are organised into two phases:

- Diploma in Advanced Studies (DAS), that is divided into a 200 h. (20 credits) intra-departmental taught component (see Annex II) and a 120 h. experimental research project (“Master”), concluded by a dissertation summarising the results and conclusions. The student must defend his/her work in a public session before of a Committee of academic staff. This stage usually takes around two years for a full-time student.
- Ph.D. stage: The student must develop a research project under the supervision and direction of one of the academic staff of the Department. This period usually takes at least two years for full time students already holding a masters degree.

Department of Veterinary Faculty - Ph.D. Programmes	Number of students enrolled (no. of veterinarians)			
	taught courses	DAS research project	achieving DAS	Ph.D. phase
Anatomy, Embryology and Genetics - Genetics and development	9	3	3 (0)	4 (1)
Biochemistry and molecular and cellular biology - Biochemistry and molecular and cellular biology	22	22	22 (2)	11 (1)
Veterinary Medicine - Animal pathology: animal health - Animal pathology: animal reproduction	31	20	17 (16)	13 (13)
Animal Production and Food Science - Food science - Animal production	17	10	10 (5)	8 (5)
Agrarian agriculture and economics - Advances in agricultural sciences and the environment	16	7	7 (2)	1 (0)

Ph.D. students are involved in undergraduate practical teaching for 80 hours per year.

Postgraduate Clinical Training

The Faculty offers Diplomas in ‘Small Animal Medicine and Surgery’ (part I and part II) in which 20 full-time students (termed ‘residential students’) are currently enrolled. This comprises training in anaesthesia and intensive care (3 months each) and internal medicine, soft tissue surgery and traumatology and orthopaedics (6 months each). In 2005/06 a similar rotation-based equine programme will be introduced for 10 postgraduates.

Residential students in their second year get a wage from the Hospital income.

The Faculty also has ‘*alumnos internos*’, who are undergraduate students affiliated to departments, who assist with the work in the various sections.

12.2 Comments

The format of the Ph.D. programmes does not correspond to that generally adopted in Europe. The taught component spends a considerable time on a very varied and sometimes surprising range of topics (see Annex II), without covering the generic research skills (e.g. experimental planning, statistical methods, scientific writing, etc.) that would be a useful foundation for future scientists. The 2-year DAS only leave two-years for the Ph.D. work, which is noticeably shorter than most other countries.

The University and other relevant authorities should consider whether the current Ph.D. programme requirements are an appropriate way to provide a good foundation for research training, or whether extensive intra-departmental taught components are maintained simply for the sake of compliance. It would seem more appropriate to have a relative short taught component covering generic research skills organised on a Faculty-wide or University-wide basis, followed by a more extended period for Ph.D. work. The latter could usefully include an extramural placement of several months in a relevant research unit outside the Faculty.

The current postgraduate clinical training positions correspond approximately to internships in terms of the training programme and clinical functions. They significantly raise the clinical abilities of participants, and provide a useful supplement to clinical manpower.

12.3 Suggestions

- 12.1 The taught component in the Ph.D. programme should be shortened, and be a Faculty- or University-wide programme covering generic research skills.
- 12.2 The duration of the research component of Ph.D. work should be extended.

13. RESEARCH

13.1 Findings

Research is a departmental activity, carried out on a departmental basis. The Faculty does not have a role in its planning or implementation.

There has been a 40% increase in the funds for research in the last five years. As mentioned in Chapter 3, teaching activities appear to have to be funded by departmental research income.

Students can get involved in research work in the departments. By submitting the project proposed to the Academic Commission of the Faculty this can count as 'optional subject' credits in their degree. There are scholarships sponsored by the Ministry of Education available for students interested in participating in research projects.

13.2 Comments

The organisation of research on a departmental basis brings analogous drawbacks to those mentioned for teaching:

- Research does not always have a clear veterinary orientation;
- Integrated or interdisciplinary research is a matter of personal relationships/wishes, with a corresponding loss of 'critical mass';
- There is no central direction of research at Faculty level to create particular Faculty-wide theme or strong points.

As mentioned in Chapter 1, it is generally the role of a faculty to provide academic leadership and focus in the field of work (i.e. veterinary sciences for the FVM).

Undergraduates have sufficient opportunity and encouragement to become involved in research activities. The availability of course credits and scholarships for research are positive features.

13.3 Suggestions

Suggestion 2.1 concerns the need for the Faculty to have a greater academic leadership role in the activities carried out within the FVM, including research.

CONCLUSIONS

The Faculty of Veterinary Medicine of Zaragoza has made some noticeable improvements since the last evaluation visit in 1994. Its physical facilities have been considerably expanded through the addition of a veterinary teaching hospital, a pilot plant for food technology, and other new facilities and equipment. The student intake has been considerably reduced; although having more manageable undergraduate numbers is essential to improving the quality of teaching, politically and financially is never easy for a faculty to accept fewer students. The proportion of practical work in the course has been raised with the introduction of a new curriculum. The FVMZ also benefits from being located in an area with a high population of production animals, and is able to select students with high academic grades.

However, there remain challenges that the Faculty needs to address. There is a significant imbalance in the general structure of the course. Too many hours are allotted to basic sciences and to teaching agronomical subjects. In contrast, there are far too few 'core' hours for teaching clinical disciplines. In addition to making the curriculum more balanced by reviewing the subject weightings, it would be beneficial to reduce the overall curricular load, so that it leaves time for student self-directed study and reflection.

The team was pleased to note that the proportion of practical work in the teaching had increased significantly since the first evaluation of the FVMZ. However, there are still too many lectures in relation to other types of teaching. This is particularly noticeable in some disciplines that should be based on practical work, for instance radiology and propaedeutics. There needs to be an increase in the amount of practical and small group sessions, which should predominantly require active participation in problem-oriented work by all students. A serious problem is that the amount of hands-on clinical work in the 'core' course is far too low. In almost all areas and species there is not enough curricular time for staff to provide adequate coverage.

One difficulty the Faculty has in modifying the curriculum is that Spanish law sets out the subjects, their credits, when they are taught, and the 'knowledge area' that must teach them. Such a very restrictive way of defining the syllabus is not appropriate for a dynamic subject such as veterinary medicine, and causes persistent shortcomings in the course and its teaching.

The manner in which the veterinary curriculum is defined also compartmentalises the teaching, a characteristic that is mirrored and reinforced by the organisational structure of the FVMZ. One of the most noticeable features of this is a parallel structure of Faculty and departments, with the latter having a great deal of autonomy in the academic activities in their 'knowledge area'. Each subject is taught and examined separately without sufficient external input or references to ensure that it is well related to other disciplines or to the reality of veterinary needs. The Faculty needs to have a greater capacity and authority to direct and integrate ('decompartmentalise') the teaching of the veterinary course as a whole, and that of the various subjects, towards the needs of the end users. Subjects need to be given a clear and direct orientation to their application in veterinary activity or in subsequent parts of the course.

It must also be remarked that an academic 'faculty' should be concerned with more than just coordinating teaching of a collection of subjects. Research and postgraduate training, currently a purely departmental responsibility, are central to an academic presence and advancement of a subject area, in particular one that is as multidisciplinary as veterinary science. The Faculty needs to be able to give these activities cohesion, and a clear orientation towards veterinary aims.

Although it is located in a region of major agricultural importance, the production animal activity at the Faculty suffers particularly from the problems mentioned above, and gives rise to grave concerns. As already remarked the teaching of agronomy and animal production takes up an excessive proportion of curricular hours. However, many of these hours are directed towards the classical disciplines of animal science and general aspects related to the agricultural sector, which is no longer a priority for a veterinary course.

In contrast, there is no linkage of the teaching on production issues to those relating to health and ill-health, which are in a different 'knowledge area'. Such linkage is crucial both to giving a context to the

animal production teaching of a veterinary course and to an understanding of the on-farm challenges veterinarians and producers face in their professional activity. In this context, the team was pleased to hear that the staff teaching the animal production disciplines wanted to have greater involvement in issues of animal health.

In the clinical field, there is a decoupling of the Faculty-based teaching on production animals and on-farm activities. The Faculty academic staff do not seem to have any meaningful involvement in production animal cases or farm animal health management. All such applied aspects are demonstrated by practitioners recruited as adjunct professors, working with their own clients.

A systematic integration of production aspects and animal health is needed. Teaching needs to be directed towards the application and use of knowledge and skills, with systematic programmes of multi-disciplinary visits and analysis of working farms in the region being a central feature. The teaching of a herd-health approach, including the relative costs of ill-health compared with treatment strategies, should be a priority.

Cost, treatment patterns and disease considerations mean that the FVMZ should not rely on hospital-based farm animal work for access to caseload. The Faculty should also not seek to establish and maintain its own large farm or husbandry facilities, since this would be expensive to buy and run and not be representative of 'real life'. Instead the Faculty should focus its efforts in the production animal area on building up an interdisciplinary Faculty-run mobile clinic that provides an integrated and systematic herd health advisory service as well as routine clinical treatment on farms in the surrounding area. To accelerate this development, the resources currently used to pay several adjunct professors could be channelled into either appointing permanent staff for farm animal work, or into buying out and subsequently running a farm animal or mixed practice

The team was pleased to see that enormous progress has been made recently in equine work. The FVMZ should continue to consolidate and reinforce this activity. The area is noticeably understaffed, and needs both more personnel specifically working in the equine clinical area, and more active involvement of the discipline-based sections in the equine clinic. As with the farm animal activity, the Faculty could consider replacing several adjunct professor positions with 2 – 3 permanent ones. Some attention to the equine facilities is also required.

The small animal facilities and caseload generally provide a satisfactory basis for the teaching on these species, and clinical activities are well integrated within the new Veterinary Teaching Hospital. As noted previously, the amount of hands-on clinical teaching has to be significantly increased, which will require a reinforcement of the clinical teaching staff working in the VTH. In this respect, it should be noted that clinical service is *sine qua non* obligation of academic staff working in the clinical field as the focal point of teaching and other work.

The need to reinforce clinical activities and increase the training in this area highlights the fact that veterinary training is inevitably one of the most expensive forms of education. The consumables and transport required, the need for intensive small group teaching, and the necessity of maintaining a high level of clinical services mean that it requires a high level of resources. This is not recognised by the authorities in terms of the budget, with teaching being noticeably under-funded, and having to be paid for out of departmental income.

In the past decade, the Faculty of Veterinary Medicine of Zaragoza has addressed many shortcomings to establish a sound basis for veterinary training. Some challenges remain, not all of them unique to Zaragoza or originating from within the Faculty. The FVMZ needs to continue with progress, especially through clearly orienting its goals, activities and training towards the needs of society in general, and the veterinary profession in particular.

SUMMARY OF SUGGESTIONS

1/ Suggestions which, if not implemented, mean that the establishment does not reach the minimum level specified in the EU veterinary training directives (Directive 78/1027/EC and its appendix) as interpreted in the 'Guidelines, requirements and main indicators' (contained within document XV/E/8488/2/98).

- 4.6 The amount of intramural hands-on clinical training in the core course must be increased.
- 4.14 The Faculty engagement in farm animal teaching and clinical services must be improved, including:
- Integrating the teaching on production aspects with that on farm animal health, so that it coherently addresses inter-related veterinary problems that span these fields;
 - Establishing sound and credible production animal health services based on the Faculty (see also Suggestion 6.3 on mobile clinic);
 - Requiring that the staff who are providing teaching on farm animal issues have a strong participation in activities and veterinary problems 'in the field'.
 - Ensuring the FVMZ provides control and direction over the practical teaching and evaluation on production animal work in this area, which must be closely linked to the structured teaching programme at the Faculty.

2/ Suggestions whose implementation does not affect the conformity of the teaching at the University with EU veterinary training directives as interpreted in the 'Guidelines, requirements and main indicators'.

1. OBJECTIVES

- 1.1 The strategic plans of the Faculty should have a timetable for completion, and be linked to an agreement on resourcing by the authorities responsible.
- 1.2 Some specific weaknesses of the Faculty, and plans for rectifying them, should be highlighted.

The need for the Faculty to have more influence over teaching and research is mentioned in Suggestion 2.1.

2. ORGANISATION

- 2.1 The Faculty should have a clearer and more authoritative role in directing academic activities (e.g. undergraduate teaching, postgraduate training and research) within the FVMZ.
- 2.2 The Faculty should have an authoritative body for curricular review, responsible for the active coordination and integration of the teaching of different subjects, and ensuring that the teaching in all areas and disciplines is oriented towards 'end-user' needs.

3. FINANCES

- 3.1 There should be adequate funding of teaching activities, in particular a well-structured programme of practical work.
- 3.2 The Faculty should have more financial control and leverage, in particular so that it can specify (and support) an appropriate level of structured practical teaching.
- 3.3 The funding allocation model used by the University should take account of the extent to which a course is of an experimental nature, using a realistic view of the actual costs of a training programme.

4. CURRICULUM AND TEACHING

4.1 GENERAL

- 4.1 The FVMZ, and the authorities who have responsibility for the regulation of the syllabus, should systematically 'decompartmentalise' the curriculum, to explicitly allow and encourage interdisciplinary teaching, and to facilitate or require active horizontal and vertical interlinking of content.
- 4.2 There should be an authoritative Faculty Curriculum Committee or similar body that has the power to direct, shape and integrate the content taught by different departments into a cohesive whole.
- 4.3 The curriculum should be structured using an 'end user' approach, so that the teaching in the final years is explicitly aimed at equipping students with the knowledge and skills they need for professional activity, that the earlier teaching directly supports this, and that the allocation of curricular hours reflects this objective.
- 4.4 The curricular hours attributed to the basic sciences and animal production disciplines should be reduced, considerably in the case of the latter, and the amount of time spent on clinical subjects increased.
- 4.5 The proportion of work of a practical or tutorial nature should be improved, by increasing the amount of practical and supervised work, and considerably reducing the number of lectures. Lectures should not be repeated.
- 4.6 (*Category 1 suggestion*)
- 4.7 The elective work should have a greater practical component, and its overall structure be directed at providing students with a greater experience in a specific veterinary field.
- 4.8 The extramural work should have a clearer structure that is more oriented towards complementing the formal teaching by the Faculty.

4.2 BASIC SUBJECTS AND BASIC SCIENCES

The need to reduce the amount of teaching in the basic sciences, in particular the theoretical load, has been mentioned in Suggestion 4.4

- 4.9 A proportion of the lecture hours in the basic sciences (especially anatomy, cytology/histology, general pathology, infectious diseases, microbiology, immunology and parasitology) should be replaced by problem-oriented learning in small groups.

Suggestion 9.1 concerns the need to improve the student selection procedures and intake requirements, so that the undergraduates starting the veterinary course have an adequate level of knowledge in the basic subjects (physics, chemistry, mathematics and biology).

See also Suggestion 6.6 regarding the involvement of some of the paraclinical sections in the Hospital.

4.3 ANIMAL PRODUCTION

The need to substantially reduce amount of teaching hours allocated to the animal production area is mentioned in Suggestion 4.4.

- 4.10 The animal production teaching should dispense with the pure animal science and general agronomical and zootechnical elements, and focus clearly on the production aspects that are directly relevant to applied veterinary activity.
- 4.11 The animal production disciplines should have a much greater practical component, taught predominantly using a problem-oriented on-farm approach, and with close linkage of the theoretical teaching programme to the practical activities.

4.4 CLINICAL SCIENCES

The need to increase the amount of curricular time allocated to the clinical disciplines has been mentioned in Suggestion 4.4.

Suggestion 4.6 concerns the requirement to increase the amount of hands-on clinical work.

4.14 (Category 1 suggestion)

4.5 FOOD HYGIENE

4.25 The balance between theoretical and practical classes in the food hygiene teaching should be improved

4.26 The food hygiene training should be reinforced by a compulsory component of extra-mural activity.

4.27 The teaching covering preventive medicine should incorporate matters related to animal production and health, as well as having a field focused approach

5. TEACHING: QUALITY AND EVALUATION

5.1 The Faculty should seek to improve the relevance of the evaluation questionnaire to veterinary studies by consulting with teachers, students and graduates. It should also seek to improve the participation rate of the students by requiring all the class to complete questionnaires.

The suggestions made in relation to the curriculum (e.g. on integration, mix of practical, theoretical and supervised work, etc.), in particular those in Section 4.1, will have a considerable influence on the teaching approach and methodology.

5.2 Students should have to pass the examinations in prerequisite subjects before being permitted to enrol for more advanced subjects. Students should also not be permitted to start a further 'cycle' of the curriculum unless they have successfully completed at least 80%-90% of all the subjects and the examinations of the preceding cycle.

5.3 There should be mechanisms and safeguards to objectively assess the level reached in a subject, such as external examiners who can independently assess written material and repeats of oral examinations.

5.4 There should be a system to externally and objectively assess whether the content of a subject and its teaching is relevant, comprehensive and well-matched to the priorities of subsequent studies or professional activity. For the applied subjects (such as clinical training, animal production and veterinary public health), practitioners should be included in this process.

6. PHYSICAL FACILITIES AND EQUIPMENT

6.1 The ongoing programme of renovation should be continued, to progressively refurbish the older buildings on the site.

6.2 The Faculty should aim to establish larger practical teaching laboratories for use by several departments, to facilitate a reduction in the number of repeats of each session.

6.3 The FVMZ should establish a Faculty-run production animal mobile health service that includes a systematic herd-health advisory service as well as single animal clinical work.

Suggestion 4.14 relates to the need to improve the activities in the production animal area. This is primarily due to concerns about the teaching programme, but has major implications for the structure of farm animal clinical activities at the FVMZ *per se*.

6.4 The number of clinicians providing clinical services in the equine hospital should be increased, including through the full participation of all discipline-based sections in equine clinical services.

- 6.5 The design errors and other drawbacks in the equine facilities should be remedied as soon as possible.
- 6.6 The section of parasitology and infectious diseases should have greater involvement in clinical activities in terms of being consulted on cases in their fields, and providing a dependable diagnostic service to the Hospital

Suggestion 10.2 relates to the need for all of the academic staff working in clinical sections to be actively and fully involved in providing clinical services.

7. ANIMALS AND TEACHING MATERIAL OF ANIMAL ORIGIN

The suggestions concerning undergraduate exposure to animals relate mainly to :

- The amount of practical and clinical work in the course (see Suggestion 4.4 – 4.6);
- A lack of structure and coordination to the production animal teaching (see Suggestion 4.14);
- A need to develop some clinical activities (see Suggestion 6.3 and 6.4).

8. LIBRARY AND EDUCATIONAL RESOURCES

- 8.1 The departmental libraries should for the most part be subsumed into the main Faculty Library.
- 8.2 There should be adequate provision of up-to-date computers for use in both the structured teaching and for students' self-directed work and general use.

9. ENROLMENT AND ADMISSION REQUIREMENTS

- 9.1 Students starting the veterinary course should already be equipped with an adequate level of knowledge in the basic science subjects (biology, chemistry, mathematics and physics).

10. ACADEMIC AND SUPPORT STAFF

- 10.1 There should be a systematic and long-term programme to change the staffing structure and organisation of the Faculty to reflect the overall needs of sound veterinary teaching, in particular:
- A rebalanced distribution of staff that reflects the working areas of veterinary graduates and the teaching required (see Suggestion 4.3) to produce graduates with the basic knowledge and skills for such professional activity;
 - A clear academic orientation and affiliation to veterinary medicine and science, along with a good awareness of applied professional activity;
 - Establishing strong interdisciplinary links between different sections and departments, and reinforcing areas where there are knowledge gaps.
- 10.2 All academic staff who are in a clinical section should have active and structured involvement in the clinical services of the VTH and in off-site work if they are work in the farm animal and/or animal production area.

Suggestion 4.14 is concerned with the pressing need to change the teaching programme as regards farm animal health, and has substantial implications for the working patterns and interaction of staff.

- 10.3 The Faculty and University authorities should encourage, or require, greater mobility and interaction of staff;
- Between knowledge areas in the same Faculty, where cross-fertilisation and an outside perspective would be valuable;
 - To and from other veterinary faculties within Spain, and preferably from beyond;
- 10.4 The FVMZ and University should aim to establish a more balanced (pyramidal) staffing structure, with fewer intermediate positions and clear promotion paths.

11. CONTINUING EDUCATION

- 11.1 In collaboration with the local veterinary organisations, the Faculty should take a leading role in organising or facilitating continuing professional education in the region.

12. POSTGRADUATE EDUCATION

- 12.1 The taught component in the Ph.D. programme should be shortened, and be a Faculty- or University-wide programme covering generic research skills.
- 12.2 The duration of the research component of Ph.D. work should be extended.

13. RESEARCH

Suggestion 2.1 concerns the need for the Faculty to have a greater academic leadership role in the activities carried out within the FVM, including research.

Annex I: Courses in elective groups

Student in the 1st cycle have to take at least 45 hours of elective courses. They can also choose subjects offered by departments of other faculties.

1st cycle FVMZ elective subjects

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Ethnology of pets and competition animals	30	15				45
Animal experiments	30	12	3			45
Computer tools for scientific experiments	10	35				45
Chemical analysis	40	20				60

2nd cycle veterinary students have to take 180 hours of electives. They may chose freely from different groups, or opt for courses offered by departments of other faculties.

2nd cycle elective group: Biotechnology applied to veterinary sciences

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Biotechnology methods	10	35				45
Biotechnology applied to molecular pathology	35	10				45
Biotechnology and environmental	35	10				45
Biotechnology and agrarian products	35	10				45

2nd cycle elective group: Pet medicine and surgery

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Neurophysiology	30	15				45
Dermatology veterinary clinic	30	15				45
Ethology veterinary clinic	35	10				45
Traumatology, Orthopaedics and Podology	30	15				45

2nd cycle elective group: Animal production

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Fodder and pasture production	30	15				45
Selection methods	30	15				45
Nutrition pathology in large and farm animals	30	15				45
Projects and buildings for livestock	30	15				45

2nd cycle elective group: Animal protection and environmental conservation

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Wild fauna. genetic studies and conservation of biodiversity	30	15				45
Microbial ecology	30	15				45
Environmental pathology	30	15				45
Environmental toxicology	30	15				45

2nd cycle elective group: Public health and food control

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Food microbiology	30	15				45
Commercialization of farm and agrarian products	30	15				45
Food quality control	30	15				45
Food parasitology	30	15				45

2nd cycle elective group: Food technology

Subject	Hours of training					
	lectures	practical work	supervised work	clinical work	other work	total
Fish science and technology	30	15				45
Meat science and technology	90	60				150
Milk science and technology	90	60				150
Economy and management of food companies	45	10				55

Annex II: Taught component of Ph.D. programmes

Ph.D. programme courses	credits
Genetics and developing	
Introduction to genetic therapy. Social and ethical implications	4
Cellular and molecular bases of development	3
Transgenic animals: Production and use	3
Biotechnical bases of gene manipulation	6
Biosecurity	6
Synthesis of recombinant protein and production of antibodies	3
Basis of the PCR technique: applications in production and health and their ethical implications	6
Simulation of morphological models by computer	5
Practical courses about the hip: anatomical, biomechanical and radiological aspects, clinical and evolutionary	6
Advanced techniques for morphological models on the computer (course given by mail)	4
Biochemistry and molecular and cellular biology	
Techniques of Molecular Biology I	3
Genetic Analysis	5
Molecular Pathology	6
Theoretical practical course in cellular separation. Cellular viability study methods	3
Animal pathology: animal health	
Parasitological zoonoses	4
Ictiopathology	4
Veterinary medical entomology	3
Environmental pathology	6
Sheep and goat pathology	6
Wild fauna pathology	3
Neoplasias of the breathing tract in pets	3
Basic ophthalmology for vets	3
Contagious Spongiform Encephalopathies	3
Epidemiology and preventive medicine in pigs and other domestic species	6
Homeopathy and homeopathic therapeutics in Veterinary Sciences	4
Ticks and transmissible diseases	3
Comparative and immunopathological immunology in Veterinary Medicine	3
The microbiological laboratory as support in veterinary health	4
Microbiological analytical techniques for the detection of environmental pathogens	3
Intensive care and anaesthetics in small animals. Introduction	3
Intensive care and anaesthetics in small animals. Techniques used	3
Animal pathology: animal reproduction	
Pig Reproduction	3
Reproduction Biotechnology	3
Behaviour and factors involved in reproduction	3
Events related to gestation	3
Reproduction in different animal species	6
Basic mechanisms in animal reproduction	6
Food science	
Basic parameters for the quality of meat	3
New tools applicable to quality control and sanitary guarantee - ARCP	3
Food regulations	3
Immunochemical techniques applied to quality control in food	3
Dietary and nutritional requirements as a basis for food quality	3
Quality control of fruit and vegetable products	3
Micro-organism isolation and identification systems in food hygiene and inspection	3
Study of different antimicrobials as apposed to micro-organisms of interest in food hygiene	3
New food hygiene and sterilization methods	4
The colour of foods	4

Animal production	
Sheep reproduction	4
Basic parameters in the quality of meat	3
Animal feeding in extensive systems	3
Animal production (extensive systems)	3
Animal welfare and animal behaviour	3
Genetic improvement in cattle rearing	3
Comparative nutrition: Digestion and absorption of nutrients	4
Bovines reproduction	3
Statistical techniques for researches: regression and experimental design	3
Analysis of multivariant data with SPSS	3
Advances in agricultural and environmental science	
Biodiversity, Genetics and Plant Preservation	3
Applications of “in vitro” outcrop in plant improvement	3
Physiological, biochemical and molecular techniques	3
Systems for the production and optimization of water resources in alternative agriculture	6
Analytical techniques for the valuation of ground and water quality	3
Prevention and control of ground deterioration by agricultural activities	3
New ground taxonomy (FAO)	3
Biodiversity of agropastoral ecosystems.	3
Classification, cartography and evaluation of grazing and forage resources	3
The Ecosystem of the olive growing in Aragón and its contribution to development.	3
Host/parasites: environment interactions	4
Post-harvest fruit handling: machinery and product quality	3
Systematic theory: Applications in R+D in agricultural production and economy.	3
Present day applications in optimization	3
New strategies for rural space and policies for rural development.	4
State intervention agricultural markets.	3
New perspectives in good and agricultural marketing.	3