

Using Live Animals for Teaching in Animal Sciences: Students' Attitudes To Their Learning Process and Animal Welfare Concern

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Abstract: The opinions of students at the Faculty of Agriculture (Seville University, Spain) concerning the educational usefulness and the affectation of the rabbits welfare of a university farm for teaching Rabbit Farming were analyzed. Both prior to beginning the course as well as upon completion, the majority of students supported the use of the farm for conducting the practicals (97.9% before the course; 100.0% after) they preferred to learn on the university farm rather than visiting commercial farms (90.7% before; 95.3% after) and they believed the welfare of the rabbits was not harmed (63.8% before; 54.7% after), or if it was harmed that it was not reason enough to discontinue the use of the rabbits for the practicals (36.2% before; 40.4% after). The students' expectations prior to participating in the practicals and their opinions upon completion revealed that they thought that with the university farm they learned 60% more than without its help. The majority of Agricultural Engineering students agreed that the establishment of a teaching farm in the university for the purpose of Rabbit Farming practicals significantly improved the teaching learning process and the majority of students perceived the welfare of the rabbits was not negatively affected.

Key words: Education, students' attitudes, teaching farm, animal sciences, university, rabbit

INTRODUCTION

In the teaching of Animal Sciences at the university level, the knowledge and competence related to the practical aspects of farm operation and management is passed on less efficiently if only classical teaching methods are employed, the only support being audiovisual aids, without visiting farms or handling livestock (Reiling *et al.*, 2003). The fact that students every day have less and less contact with the rural world and with livestock (Marshall *et al.*, 1998; Mollett and Leslie, 1986; Reiling *et al.*, 2003) contributes to this problem. To make up for this deficiency students tend to demand more hands-on experience in Animal Science courses (Kesler, 1997; Marshall *et al.*, 1998; Reiling *et al.*, 2003) because it is useful for students to gain practical experience on farms that enables them to relate the theoretical knowledge gained to more practical aspects of livestock handling and the functioning of farms.

Aimed at improving the efficiency of acquiring practical knowledge of Rabbit Farming for students of the faculty of agriculture at the Seville University (Spain), a meat rabbit (*Oryctolagus cuniculus*) farm was implemented to be used in the realization of practicals for

the elective course Poultry and Rabbit Science. However, the keeping of animals for research or educational purposes is considered every day less ethically acceptable, due to the harm caused to the animals involved (King, 2004; Smith and Smith, 2004; Van Der Valk *et al.*, 1999), leading to a tendency to reduce its use and substitute it with alternative methods (King, 2004; Morton, 1987; Van Der Valk *et al.*, 1999). The aim of this article is to investigate the opinion of the students of the Faculty of Agriculture at the Seville University regarding the usefulness of completing practicals on a rabbit farm belonging to the university and their perception of the possible effects on the welfare of the animals used.

MATERIALS AND METHODS

Teaching farm and animals: During the 2002/2003 academic year a teaching farm of meat rabbits was implemented in the faculty of agriculture of the Seville University (Spain). The farm was composed of 15 female and two male breeders, housed in multifunction flat deck cages identical to those used in commercial farms and handled under similar conditions (Lebas *et al.*, 1997)

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meeting the legal requirements concerning the respectful handling of animals (MAPA, 2004; Council of Europe, 1986a, b). The farm was located in a conventional facility and was kept in operation during the length of the elective Poultry and Rabbit Science (second semester of the academic year), given in the Faculty of Agriculture. The practicals given were the following: mating (by means of natural mating), pregnancy diagnosis (by means of abdominal palpation), nest boxes handling (providing wood shavings), peribirth and litter monitoring (noting the count and weight of the newborn kits), weaning (transferring the kits to fattening cages) and fattening finalization (weighing and vaccinating the kits against myxomatosis and viral haemorrhagic disease). The rabbits were not slaughtered.

These practicals were chosen according to a combination of criteria: the relevant characteristics of the tasks (for their being useful for learning about rabbit farming) and the learning environment in which the tasks will be used by the students (Tomanek *et al.*, 2008). The students were divided into four groups with a maximum of 20 students per group. Every fieldwork session of one group had a duration of 1 h, so that for every session in the farm the rabbits were visited and handled for a total of 4 h.

Sample and evaluation of students' attitudes: During the 2003/2004 academic year, the students' learning expectations and their preconceived opinion concerning the convenience of carrying out practicals using live rabbits and their opinion the possible effect it has on the welfare of the rabbits were evaluated by means of a questionnaire completed before beginning the practicals. Their posterior opinion concerning the carrying out of practicals with live animals, their perception concerning whether or not the welfare of the rabbits was jeopardized as a consequence of the practicals and their perception of how many they had learned were evaluated by means of a second questionnaire carried out at the end of the semester. In order to relate the expectations prior to the practicals with the opinion upon completion, the students were asked to use a pseudonym on both questionnaires, thus making it possible to identify the two questionnaires of each student, while maintaining anonymity, avoiding the possibility that the students would be too shy to answer. Although, 78 students were enrolled in the course, only 47 questionnaires were analyzed, those belonging to the students that had completed both preliminary and final questionnaires. The level of knowledge expected and perceived by the students was rated on a scale of 0-10 points because that is the grading scale typically used in Spanish universities.

Statistical analysis: The statistical analysis were performed using student's t-tests and χ^2 -tests using the SPSS 15.0 program (SPSS Inc., Chicago, IL, USA).

RESULTS AND DISCUSSION

A 70.2% (n = 33) of the students knew before enrolling in the course that the practicals were going to be carried out using rabbits on a teaching farm belonging to the university. Of these 33 students, 65.6% (n = 21) confirmed that although, it was a favourable influence in their decision to enrol in the course, they would have enrolled in the course even if the practicals were not going to be carried out on a teaching farm. One student (3.1%) claimed to have only enrolled in the course because the practicals were going to be done with animals and the rest of those who knew that the practicals were going to be done with live rabbits (n = 10, 31.3%) confirmed that having knowledge of this did not influence their decision in selecting the course. Among those students who, upon enrolling, did not know that the practicals were going to be done with animals on a teaching farm (n = 14), 71.4% (n = 10) claimed that the idea seemed better to them when they found out while, the rest (n = 4, 28.6%) claimed that their expectations for course development were not affected by it. Of those who found out after enrolling in the course that the practicals would be carried out with live rabbits, no one said this option to be worse.

Table 1 shows, the students' opinions, previous and posterior to the realization of practicals, of the influence that conducting them with rabbits on the teaching farm has on the improvement of the educational quality of the subject. Table 1 shows the preferences, before and after the practicals, about the options of completing the practicals on a farm property of the university, or visiting commercial farms, both considered exclusive alternatives.

Table 1 shows, the students' opinion of the effect on the welfare of the rabbits when using them in practicals. According to the specific comments in some questionnaires, the favourable expectations for the rabbits' welfare prior to the practicals were based on the fact that the students expected that the treatment that was going to be given to the animals would be responsible and the best possible and that if their welfare was jeopardized, then they would not use them in the practicals. At the end of the term their opinion did not change significantly ($p > 0.05$). The observations of some of those questioned once the practicals were completed showed that the previous favourable perception of the rabbits' welfare was confirmed since they saw that it was

Table 1: Opinions of the students before and after relating to the use of live rabbits on a teaching farm belonging to the university (n, %)

Opinions	Before practicals	After practicals	Difference
The influence that carrying out practicals on a university farm has on the quality of teaching (n = 47)			p>0.05
Improves the quality of teaching	46 (97.9%)	47 (100.0%)	
Does not influence the quality of teaching	1 (2.1%)	0 (0.0%)	
Lowers the quality of teaching	0 (0.0%)	0 (0.0%)	
Conducting practicals on a university-owned farm compared to visiting commercial farms (n = 43)			p>0.05
Prefer university-owned farms	39 (90.7%)	41 (95.3%)	
Prefer visiting commercial farms	4 (9.3%)	2 (4.7%)	
The affectation of the welfare of the rabbits upon using them in the practicals (n = 47)			p>0.05
Was not jeopardised	30 (63.8%)	27 (54.7%)	
Was jeopardised, but that it is not an impediment for using them in practicals	17 (36.2%)	19 (40.4%)	
Was jeopardised significantly and they should not conduct practicals with them	0 (0.0%)	1 (2.1%)	

Table 2: Previous expectations and posterior evaluation of the level of learning rabbit farming by means of carrying out the practicals on the university farm (evaluated on a scale of 0-10, n = 47 students)

Expectations and opinions	Minimum	Maximum	Mean±SD ^{1,2}
Previous expectations of learning on the teaching farm	5	10	7.86±1.38a
Prior opinion of learning without the use of the teaching farm	1	8	4.89±1.60b
Perceived level of knowledge acquired after having completed the practicals	2	10	7.89±1.35a
Posterior opinion of the level of knowledge that would have been reached if the teaching farm had not been used	2	8	4.97±1.12b

¹Means followed by different letters are significantly different (p<0.001); ²SD: Standard Deviation

jeopardized less than what they expected, that it did not differ from that on an commercial farm and that the animals had not been mistreated.

Table 2 shows, the students' expectations of learning Rabbit Farming before beginning the practicals and their perception of the level of knowledge acquired after completing them. Also, indicated are the previous expectations and the level of knowledge that they thought they would have reached if they had not done the practicals on the teaching farm.

A priori students thought that conducting the practicals on a university farm would allow them to reach a significantly higher level of knowledge of Rabbit Farming (60% greater; p<0.001) than if the practicals were conducted without this farm. These expectations were clearly met when the students completed the practicals, since both what they felt they had learned with the farm, as well as the level of knowledge they thought they would have reached without its help, exactly coincided with the evaluations of the previous expectations.

It was decided to establish a teaching farm in the university because it was initially thought that with it the teaching learning process would be improved more efficiently than with other techniques and alternative teaching methods. This effect was corroborated because practically all the students thought, just as much before as after taking the course that conducting Rabbit Farming practicals on a farm belonging to the university was positive for the improvement of the teaching quality of the course (Table 1) and furthermore, the previous expectations and the post evaluations of the level of knowledge that the students thought they reached with the help of the farm were high (Table 2). A similar benefit has been described by Marshall *et al.* (1998) and

Reiling *et al.* (2003) in livestock courses, in which university farms were used for the practicals and that were also very positively evaluated by the students. Similarly, Plous (1996) states that American psychologists believe that a lot can be learned when laboratory animals are used in university teaching and Navarro *et al.* (2001) also points out that Spanish psychology students support the use of laboratory animals for the said educational use.

The benefit of improving the teaching learning process involving the realization of Rabbit Farming practicals on a farm lies mainly in two effects: the increase in students' motivation and interest in the course and the possibility that they will have hands on experience in farm research. In respect to motivation and interest, indeed two thirds of the students agreed that knowing, prior to enrolment that the practicals would be conducted using rabbits on a farm belonging to the university favourably influenced their decision to enrol in the course.

Marshall *et al.* (1998) and Reiling *et al.* (2003) also state that there is an increased interest and motivation among students who are doing practicals for animal science courses in which livestock is handled. This greater motivation implies, per se, a favourable predisposition of the students towards the course that favours the assimilation of knowledge (Ames and Archer, 1988). On the other hand, getting hands on experience in handling farm animals favours a more direct and continuous implication in its operation and management that allowed the students to acquire practical experience (Marshall *et al.*, 1998; Reiling *et al.*, 2003), which helped to increase the retention of theoretical knowledge given in the classroom, above all in students that have not had previous contact with livestock (Reiling *et al.*, 2003). In the case, learning based on practical experience provided

by the realization of practicals with the rabbits of the farm was perceived by the students as far superior to that which would have been obtained without the help of the farm (Table 2).

Some practicals similar to those studied in the case can be carried out just as well on a university farm as on commercial farms with which collaborative agreements have been established. Nevertheless, visiting commercial farms has some inconveniences in comparison with conducting practicals on a farm belonging to the university, such as less utility and efficiency when there are large groups of students, since there is usually limited contact, as well as the interference in the farmers' work, especially if the visits are repeated. The difference in the effectiveness of practicals realized by visiting commercial farms and practicals realized on a university farm was clearly sensed by the students of this study, the majority (90.7%) of who preferred, before starting the practicals, the option of relying on a university farm to that of visiting commercial farms. Once the students finished the course, the proportion of students in favour of using a university farm slightly increased (Table 1), though the difference was not significant ($p > 0.05$). Even though, in the course subject in this research commercial farms were not visited, the students had sufficient criteria in order to establish a comparison because in a required course on animal science from the previous year, part of the practicals were carried out by visiting commercial farms.

The students probably showed a clear preference for conducting the practicals on a university farm because they perceived that with the alternative of visiting commercial farms its prominence, initiative and implication in the handling of rabbits would result much more limited. In other fields of the animal and veterinary sciences also has been stated that faculty courses are the major source of information (Ghalyanchi and Shojaie, 2008), something that highlight the importance of carrying out high quality practicals at the faculty.

Nowadays, there is a general tendency to reduce the use of animals in teaching King (2004), Smith and Smith, (2004), Van Der Valk *et al.* (1999) substituting it with alternatives such as videos, models, computer programs, simulators, etc. (King, 2004; Van der Valk *et al.*, 1999), in favour of safeguarding the welfare of the animals potentially available for teaching. However, other alternatives to the use of livestock, whether on a university farm or on commercial farms visited by students, tend to be less effective in the teaching learning process of Rabbit Farming. Only few alternatives can be used to teach skills in the handling of animals (Van Der Valk *et al.*, 1999) and in cases in which the complex interactions of live organisms are being

taught, there exists no substitute for practical work (Smith and Smith, 2004) as was in the case, the breeding and rearing processes being very related to the viability of livestock farming. In effect, non-animal models, such as computer models and audiovisuals, do not allow the students to practice multiple aspects of farm management (Van Der Valk *et al.*, 1999), to which we must add that the quality of audiovisual aids available is sometimes poor (Smith and Smith, 2004). It is obvious, from an educational standpoint that alternatives, which exclude the use of animals are in general, less efficient than practicals based on the student operation of university farms. In fact, when evaluating animal science courses in which livestock is handled, it is common for the students to demand more practical courses of the same kind (Reiling *et al.*, 2003) and in those courses in which live animals were not handled, students commonly suggest scheduling field work practicals as a way of improving the course (Kesler, 1997).

Contrarily to the findings, it has been stated in other scientific fields that students are able to learn as well as with virtual as with physical (Klahr *et al.*, 2007). Thus, more research is needed in order to compare the value and educational effectiveness of the alternatives in comparison with the methods based on the use of animals (King, 2004), particularly in the field of animal science. But, since the alternatives to the use of animals for teaching the practical aspects of Rabbit Farming are inconsistent, when turning to the use of live rabbits for teaching, as in the case, it is necessary to fulfil three basic requirements: adequate justification of the said use, avoid jeopardizing the welfare of the rabbits used and assurance that the students considered the said use fully acceptable both from an educational standpoint as well as from the affectation of the animal welfare standpoint.

The justification for the establishment of a farm for the purpose of Rabbit Farming practicals in the university can be initially sustained in the directives issued from the Directive 86/609/EEC (Council of Europe, 1986a) and the European Convention for the protection of vertebrate animals used for experimental and other scientific purposes (Council of Europe, 1986b) that regulate the use of animals in education. The latter establishes that the procedures that affect the animals should be restricted to those absolutely necessary for the educational purpose and be permitted only if the objective can not be reached using audiovisual aids or other available methods. Among the educational objectives of a course in Rabbit Farming, like the one we examined in this study, is that of providing the students with practical teaching in the handling of animals, for which a teaching farm facilitates the learning of concepts related to animal science (Reiling *et al.*, 2003).

The students that enrolled in courses like these hope to acquire practical experience (Marshall *et al.*, 1998) and show interest in subjects such as animal behaviour, handling and reproduction (Reiling *et al.*, 2003), aspects that are the most difficult to transmit efficiently using non-animal alternatives. In this sense, the use of rabbits on a teaching farm in the case was appropriate for the course objectives and was justified because compared to other possibilities, it was that which best met the said objectives (Van Der Valk *et al.*, 1999), at least in comparison with the alternative of visiting commercial farms. Thus, the students surveyed showed a strong preference for the teaching farm belonging to the university against the alternative of visiting commercial farms (Table 1).

The second requirement, which is safeguarding the welfare of the rabbits used, was guaranteed to respect the legal requirements for the implementation and upkeep of the teaching farm and upon completing the practicals under the established directives in the corresponding protocols (Council of Europe, 1986a, b; MAPA, 2004). Furthermore, the small number of animals used (17 breeder rabbits plus the proceeding offspring from the mating of each female), the reduced number of hours of sessions in which they were used and the small size of the groups of students that handled them allowed for the respect of the classic principles of the 3 Rs of Russell and Burch, at the same time effectively met the learning objectives, judging by the student opinions (Table 1 and 2). In fact, the reduced number of breeder rabbits and their offspring used in the teaching farm was sufficient to obtain results similar to that in commercial farms (Table 3).

Although, it would be necessary to conduct a specific trial in order for it to be determined, it is possible that the rabbits on a teaching farm, after having been used in practicals, have not experienced stress levels intolerably higher to those on a commercial meat rabbit farm. In this sense, the use of rabbits for practicals was acceptable, seeing as the rabbits were kept and observed in their natural state (Van Der Valk *et al.*, 1999). If it is assumed that the natural state of a meat rabbit is to live on a farm and that in the practicals of the course the rabbits underwent the same treatment, then this premise would be complied. Furthermore, the breeders and the offspring obtained in the teaching farm were not slaughtered, instead they were rehabilitated (in the sense of the fourth R identified by Pereira and Tettamanti (2005) at the end of the practicals, using some of them to replace the breeders of the farm in successive years and others were rehabilitated as pets or as production animals, giving them to interested students who had small rabbitries at home. The favourable opinion of the students in the study towards the use of rabbits

Table 3: Productive and reproductive performances of the rabbits in the teaching farm and its comparison with data from Spanish commercial farms monitored in technical-economic programs

Parameters	Teaching farm	Spanish commercial farms (range of data between 1991 and 2002) ¹
Fertility (%)	66.7	73.1-75.0
Total kits born per litter (n)	8.3	8.7-9.6
Kits weaned per litter (n)	7.7	7.0-7.8
Mortality at weaning (%)	7.2	12.6-15.1
Kits slaughtered per litter (n)	7.5	7.0-7.8
Mortality during fattening period (%)	3.2	5.4-7.9
Live weight at 63 days (kg) ²	1.8	1.9-2.0

¹Ramon *et al.* (2004); ²This age is the average age of slaughtering meat rabbits in Spain, although in the teaching farm the rabbit were not slaughtered

could also be favourable for this rehabilitation of the animals, since Smith and Smith (2004) affirm that many students consider the use of animals acceptable if in the practicals they use animals that are not exclusively destined for educational purposes.

Finally, requirement that the students consider the use of rabbits acceptable both from an educational standpoint as well as from the animal welfare affectation standpoint, has great importance because it involves ethical and emotional aspects (Smith and Smith, 2004). In this sense, part of the population considers a rabbit more of a pet than a species of food supply (Lebas *et al.*, 1997), which could cause in some students a rejection both of its consideration as a livestock species, as well as its use in teaching the course, but in the case that rejection did not seem to occur (Table 1), perhaps because in Spain rabbit livestock farming and the consumption of its meat are important, Spain being one of the main rabbit meat producers in the world (Lebas *et al.*, 1997). In this sense, the use and handling of the animals that was done in the practicals of the course were identical to those on a commercial rabbit farm, which is the natural state of farming this species predominantly in Spain and other studies demonstrate support of the students and professionals for the use of animals with research and education goals if they are used for studies observing them in their natural state or environment (Smith and Smith, 2004), if they are not caused pain, maltreatment, lesions, or not killed (Navarro *et al.*, 2001; Plous, 1996).

The fact that in the case, the students knew that the rabbits were not going to be slaughtered could serve to save them moral problems for their use, in the sense stated by Smith and Smith (2004). As a consequence of these and other circumstances not evaluated, before the realization of the practicals, two thirds of the students of the study thought that the rabbits' welfare was not jeopardized by using them in practicals and one third believed that it would be affected, but that this did not constitute an impediment for its use. Once the practicals

were completed the perception of the students did not vary significantly, even though there was a slight increase of those who thought that the rabbits' welfare was jeopardized (Table 1). The results are to a certain degree contradictory to the opinions registered by Plous (1996) in American psychologists and by Navarro *et al.* (2001) in Spanish psychology students, who overwhelmingly stated that laboratory animals are not appropriately handled. This difference can be due to the fact that the uses of animals in research and education in psychology frequently bring about the submission ad hoc of the animals to stressful experiments that did not take place in the case.

The decision for the maintenance of a teaching farm like the one studied should be based on a utilitarian analysis of the costs and benefits of the use of the animals for the students' education (King, 2004). In the case, the greatest benefit was the increased knowledge perceived on the part of the students in comparison with what they expected to have learned without the farm. But this would not be the only benefit, since the students also could have raised their appreciation and respect for the live animal, thanks to direct contact with the rabbits on the farm, as Marshall *et al.* (1998) state. On the other hand, the principal cost would be jeopardizing the welfare of the rabbits that implies its use, which it is necessary to evaluate, as has been said. In any case, it did not seem to be perceived as unacceptable by the students.

CONCLUSION

The establishment of a teaching farm for the realization of educational practicals in Rabbit Farming by the students of Agricultural Engineering was very satisfactory for the improvement of the teaching learning process because it satisfied their previous expectations in terms of the level of knowledge to be reached, because it was considered a better option than visiting commercial farms and because the perception of the students was that conducting practicals with rabbits did not unacceptably jeopardize the animal welfare. This suggests that the students considered it justified to maintain a teaching farm with rabbits like the one studied if the animals are kept under principles compatible with the animal welfare and it can be useful as an opportunity to instil in the students the beginnings related with zootechnical farming compatible with the said welfare.

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