Manual transrectal palpations performed by veterinary students in cows: a Surrey - Palpaciones transrectales realizadas por estudiantes de veterinaria en las vacas: una encuesta

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Abstract

Veterinary education of novice veterinary students in bovine reproduction field, like rectum palpation training, represent some handicaps mainly related with animal welfare. The aim of the present study was to determine skills and competences expected by veterinary students during bovine transrectal palpation in reproduction classes with live non-pregnant females. A survey was presented to students, classified as Buiatric-Motivated (SBM; n=22) and Non-Buiatric-Motivated (SNBM; n=28), at the end of the veterinary reproduction module. Both SBM and SNBM groups were in accordance with animal alternation use in successive classes (86.8 ± 4.7% *vs.* 77.3 ± 6.5%; ± SEM; P>0.05) and they considered the proportion 1 cow:2 students in each class adequate in 68.6 ± 5.0% and 58.2 ± 5.8% (P>0.05) of the cases, respectively. The SBM had less difficulty than SNBM to identify right and left uterine horns (71.4 ± 5.7 % *vs.* 52.1 ± 4.5 %; P=0.01), identify the right (69.6 ± 4.4 % *vs.* 52.1 ± 4.0 %; P < 0.01) or left (63.6 ± 4.4 % *vs.* 47.5 ± 3.9 %; P<0.01) ovaries and the presence of follicles > 10 mm (55.5 ± 6.5 % *vs.* 31.1 ± 5.0 %; P<0.01). The SBM group (61.8 ± 5.2 %) also showed a more expected self-training competence in dairy farms than SNBM (38.8 ± 4.8 %; P<0.01). In conclusion, we suggest an alternation of cows used for daily manual transrectal training purpose, regarding the animal welfare and student sensibility. The student motivation and expectation appear to be determinant factors to maximize their training.

Keyword: Bovine Reproduction; Veterinary Education; Animal Welfare

Resumen

La educación veterinaria de estudiantes de veterinaria en el campo de la reproducción bovina, en el caso del entrenamiento mediante la palpación transrectal, tiene algunas desventajas, principalmente relacionadas con el bienestar animal. El objetivo del presente estudio fue determinar las habilidades y competencias esperadas por los estudiantes de veterinaria durante la palpación transrectal en vacas no preñadas, en las clases de reproducción. Al final del módulo de reproducción, los estudiantes fueron clasificados como motivados en la buiatria (SBM, n = 22) y no motivados en la buiatria (SNBM; n = 28) realizando una encuesta. Ambos los grupos, SBM e SNBM, estaban de acuerdo con la alternancia del uso de animales en las sucesivas clases (86,8 ± 4,7% *vs.* 77,3 ± 6,5%; ± EEM; P>0,05) y consideraron adecuada, en cada clase práctica, la proporción de una vaca para dos estudiantes en 68,6 ± 5,0% and 58,2 ± 5,8% (P>0,05) de los casos, respectivamente. El grupo SBM tuvo menos dificultades que SNBM para identificar cuernos uterinos derecho e izquierdo (71,4 ± 5,7 % *vs.* 52,1 ± 4,5 %; P=0,01), identificar el ovario derecho (69,6 ± 4,4 % *vs.* 52,1 ± 4,0 %; P < 0,01) o izquierdo (63,6 ± 4,4 % *vs.* 47.5 ± 3,9 %; P<0,01) y la presencia de folículos > 10 mm (55,5 ± 6,5 % *vs.* 31,1 ± 5,0 %; P<0,01). El grupo SBM (61,8 ± 5,2%) también mostro una mayor expectativa en su capacidad de auto-formación en las explotaciones lecheras que el SNBM (38,8 ± 4,8%, p <0,01). En conclusión, teniendo en cuenta con el bienestar de los animales y la sensibilidad de los estudiantes, se sugiere una alternancia de las vacas utilizadas para fines de formación diaria en palpación transrectal. La motivación de los estudiantes y sus expectativas parecen ser factores determinantes para maximizar su entrenamiento.

Palabras clave: Reproducción Bovina, Educación Veterinaria; Bienestar Animal

1. Introduction

The curricular practical training using live animals by veterinary students assumes a great importance in several fields of Veterinary Medicine and Animal Production, including basic theriogenology education and training at schools (Root Kustritz *et al.*, 2006). In Portugal, like in others European countries, the adapted *curriculum* of Veterinary Medicine courses to Bologna Process have 5 to 6 years of duration, e.g. 10 to 12 semesters, including a large practical class's component. Many clinical and zootechnical practices are performed in classrooms of veterinary hospitals, experimental large animal facilities and regional animal farms with small students groups (6 to 12 persons). In general, these practices increase from the 7th semester until the end of the course, when the basic theory background was previously learned. These clinical "entry-level" students have several handicaps in their training regarding ethical procedures and animal welfare (Lopes and Rocha, 2006) *versus* teaching costs and quality.

The manual transrectal palpation in cows, for reproduction management purposes, is one of these classical polemic practices that should be acquired by veterinary students, especially if they expect a professional buiatric activity. It is a commonly veterinary practice applied to reproduction programs management in cow industry (Sprecher et al., 1994), due to easy accessibility of reproductive structure from rectum, low cost, accurate and efficient method. However, it is a traumatic and subjective technique but, today, is usually accomplished by the ultrasonographic examinations with transrectal probes application (Fricke, 2002; Lamb *et al.*, 2003) during the herd's reproduction management.

Some partial solutions for the student training purposes were studied, like the use of live animals in slaughterhouses (Lopes and Rocha, 2006) or computer assisted learn without living cows (Baillie *et al.,* 2005a; Forrest *et al.,* 2009). Each of them presents advantages and also some limitations. Both methodologies can minimize the use of live animals at "laboratory" schools. However, in the slaughterhouses, animal minimized stress should be provided before dead. On the other end, the use of virtual simulators cannot substitutes the real case training situations. We believe that skills and competences expected by the students are critical points to resolve these pertinent questions, in other to maximize each teaching method and minimize the live animal's uses (Jaarsma, 2008).

The main aim of the present work was to determine skills and competences expected by veterinary students during bovine transrectal palpation, in reproduction classes using live nonpregnant females.

2. Material and Methods

2.1 Animals and teaching facilities

The experimental bovine station of university of Trás-os-Montes e Alto Douro, located at Vila Real-Portugal, was used to train 50 veterinary students in order to evaluate non-pregnant uterine structures, during reproduction classes (7th semester of the Veterinary *curriculum* course). Initially, six adults Holstein-Frisian (dairy cattle breed) and four Barrosã (local Portuguese beef cows breed) were daily disposed for this purpose, during 6 consecutive weeks, from Monday to Friday.

The students were divided in 8 small groups, having a total of 3 lessons, 2 hours length each, throughout these weeks. The 1st, 2nd and 3rd lessons aimed to identify and characterize the cervix, the uterine horns and the ovarian structures, respectively.

The mean effective students: cows proportion during whole classes was 2:1, due to the inadequate behavior of some animals, which had partially or not been used (two beef cows).

2.2 Survey methodology

An anonymous survey was presented to students at the end of the 3rd lesson. All answers to questions were presented in a scale score from 0 to 100% of expected results (Table 1) and considering their previous experience.

Table 1 Questions and answer scores in the model survey

Question	Answer scored in percentage of cases according the student perception *	
Buiatric-Motivated or Non-Buiatric-Motivated? **	No	Yes
You participate(d) in the ERASMUS program? **	No	Yes
Is your first transrectal palpation in cows? ***	No	Yes
Is the number of animals sufficient (1 per 2 students) in all classes?	0 10 20 30 40 50 60 70 80 90 100 (%)	
A daily animal alternation will be considered?	0 10 20 30 40 50 60 70 80 90 100 (%)	
What the percentage of cows with adequate behavior for training?	0 10 20 30 40 50 60 70 80 90 100 (%)	
What the percentage of cows with rectal bleeding?	0 10 20 30 40 50 60 70 80 90 100 (%)	
What is your success percentage to locate the right uterine horn?	0 10 20 30 40 50 60 70 80 90 100 (%)	
What is your success percentage to locate the left uterine horn?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you evaluate the uterine horns conformation?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you identify the right ovary?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you identify the left ovary?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you evaluate the relative ovarian diameter?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you identify follicles > 10 mm?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Can you detect "anoestrous" (both typical small) ovaries?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Is the number of lessons sufficient?	0 10 20 30 40 50 60 70 80 90 100 (%)	
Have you self-training competence to carry the training in private dairy farms?	0 10 20 30 40 50 60 70 80 90 100 (%)	

* Except for the first three questions. **The first two questions concerned the independent variables. *** Nominal dependent variable.

Students were classified as Buiatric-Motivated (SBM; n=22) or Non-Buiatric-Motivated (SNBM; n=28), according their declared motivation. They were also independently classified as Erasmus (n=10) or non-Erasmus students (n=40).

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2.3 Statistical analysis

A factorial ANOVA was used and interactions between groups tested. All dependent variables were considered continues, except the classification for the previous experience in bovine transrectal palpation (categorical variable) which was analysed by the chi-square test. Results, in percentage of response, were showed as mean ± S.E.M..

3. Results and Discussion

The majority of students (78 %, 39/50 *vs.* 22 %, 11/50; P<0.001) never had a previous experience in transrectal palpation of cows, before the reproduction classes. It´s a preoccupant report, because this presupposes few contacts with the reality bovine farms, e.g. client-owned animals, and veterinary tutorial assistance, e.g. short duration extramural placements, until the 7th Semester of some Veterinary Medicine Courses. This aspect can create some difficulties to choices optional Curricular Unit of animal's species production and herd health management subject in last semesters of veterinary courses.

No differences (P>0.05) were observed between Erasmus and non-Erasmus students for this previous experience factor or all following described parameters. No significant differences (P>0.05) interactions were observed between (Non-) Erasmus and (Non-) Buiatric-Motivated groups for alls variables.

Both SBM and SNBM groups were in accordance with animal alternation use in successive classes (86.8 ± 4.7 % *vs.*77.3 ± 6.5 %; P>0.05) and they considered the proportion 1 cow:2 students in each class adequate in 68.6 ± 5.0 % and 58.2 ± 5.8 % (P>0.05) of the cases, respectively.

The successive utilization of cows for palpation induces rectal bleeding by mucosal wounds due to that traumatic technique. In extreme, a diffuse peritonitis can occurs conducting to female dead. In the present study, high rectal bleeding percentages were detected by both groups, but no differences of awareness rectal bleeding were observed between SBM (68.9 ± 4.9 %) and SNBM (66.7 ± 7.2 %; P>0.05) groups. This suggests a high sensibility of all students for animal welfare subjects. However, SNBM (40.0 ± 4.1 %) tended to consider animals with non adequate behavior for training purposes in comparison to the SBM group (29.0 ± 4.9 %; P = 0.09). We think that motivation represents a positive factor related with the animal contact, despite the objective of all students to obtain a positive final evaluation record. In fact, two beef cows remained always unusable for this practice during whole classes and, sometimes, the use of some remained cows was partially restricted.

Important differences were observed between the two groups related with the identification and characterization of the several uterine or ovarian structures, like the described in the Fig. 1a, 1b and 1c.
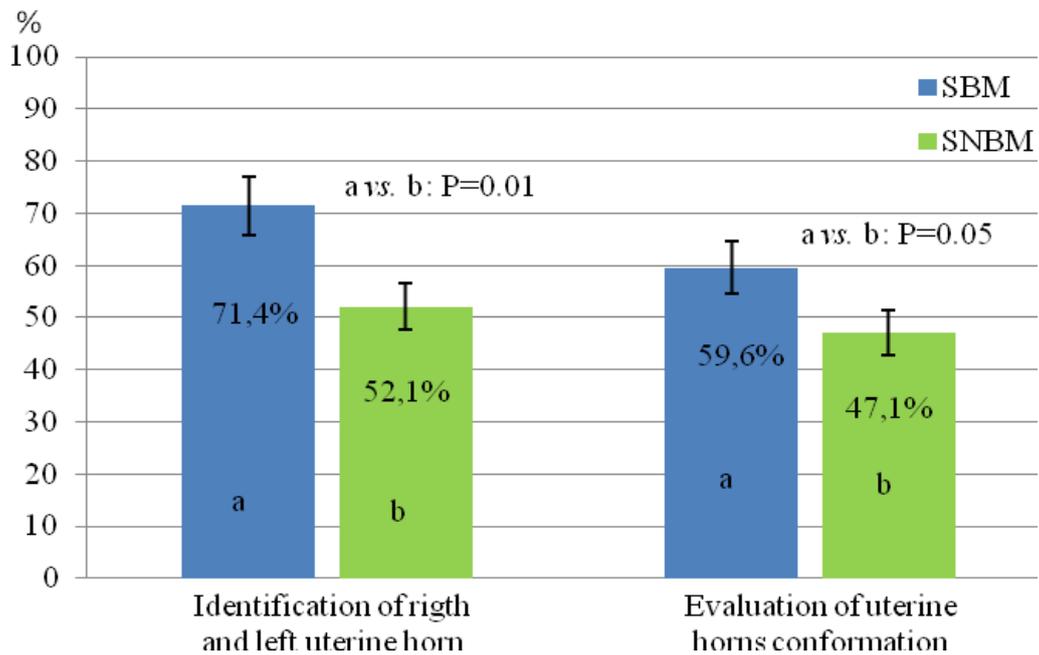
Fig. 1a Identification and conformation evaluation of bovine uterine horns, in percentage, by Buiatric-Motivated (SBM; n=22) and Non-Buiatric-Motivated (SNBM; n=28). The bars represent ±S.E.M.
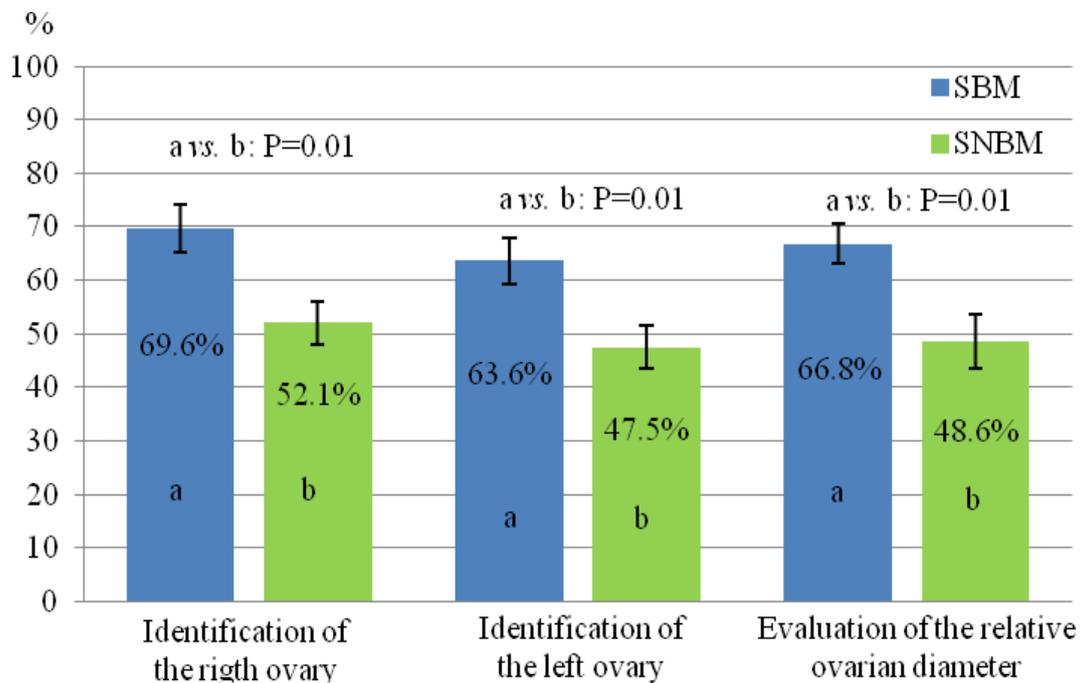
Fig. 1b Identification of both ovaries and evaluation of their relative diameter, in percentage.
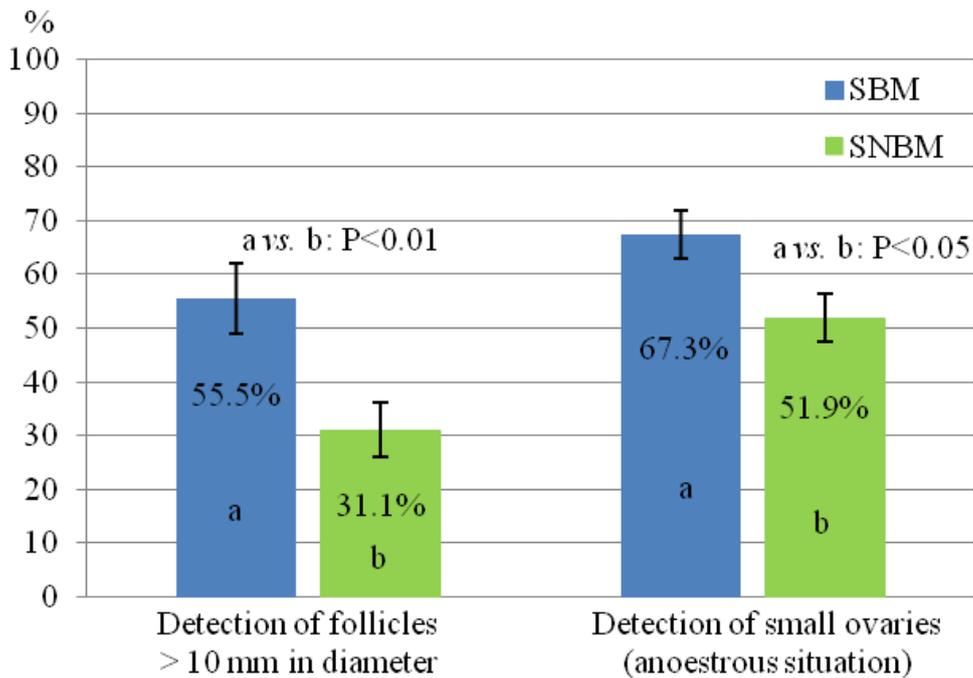
Fig. 1c Detection of follicles greater than 10 mm in diameter and "anoestrous" ovaries, in percentage.

The SBM group had less difficulty than SNBM student group to identify right and left uterine horns or ovaries, their conformation or relative size, and follicles greater than 10 mm in diameter. These results suggest that self-motivation is an important aspect to achieving high performance learning at reproduction practical classes. Several cases studies, described in veterinary literature, provide scientific consistency to this "psychological status". A high student motivation was observed by Parkinson *et al.* (2006) when new subjects, issues related with clinical practice, live animals or enthusiastic persons were directly involved in learning process. However, some teaching activities can improve the student motivation: the presence of active learning environments (Doucet et al., 2009), pre-clinical and clinical student-centered learning models (Elsheikha and Kendall, 2009) or *curriculum* integration like imaging, veterinary practical classes and visitation to bovine farms (Baillie *et al.,* 2005b).

Nor SBM (48.6 ± 5.5 %) neither SNBM (42.3 ± 3.7 %; P>0.05) considered the total number of classes sufficient for ideal transrectal training competence acquisition in order to identify uterine horns or identify and evaluate the ovarian structures. An effect of number of "laboratory" experiences classes to acquire competences in this area, before palpating client-owned animals, was observed by Sprecher *et al.* (1994). More classes with live animals or more animals per class increasing simultaneously the student number should be a reliable response to our results. Additionally, and/or in alternative, previous haptics simulator training could resolve the problem, like the tested by Baillie *et al.* (2005b, 2008, 2009, 2010). Students augmented performance during real task after computer simulator use was observed by this researchers group. In another study perfomed by Bossaert *et al.* (2009), the student's ability to localize and evaluate reproductive structures was compared when live cows or a

simulation model for rectal palpation teaching (Breed'n Betsy) were used. In this case, students who used the live cows training were more skilled at localizing the uterus and ovaries than those who used the simulation model. However, these last researchers also consider the use of their simulation model a potential value to the classical teaching method.

When questioned, SBM (61.8 ± 5.2 %) showed a more expected self-training competence in private dairy farms than SNBM (38.8 ± 4.8 %; P<0.01). This indicates that the basic skill acquired with 3 lessons (6 hours) is presumably sufficient for a significant number of Buiatric-Motivated students in order to develop experience evaluating the reproductive tract in private's dairy cattle farms. However, and according to the study of Root Kustritz *et al.* (2006), students are not able to attain adequate competency for this evaluation, immediately at graduation in schools. A specific curricular stage with a veterinary tutor should be realized by each interested student in these farms. Additionally, the carefulness assessment of early pregnant cows by students little experience remains a premise, like the suggested in the study reported by Vaillancourt *et al.* (1979).

According to Bossaert *et al.* (2006), quite possibly more than palpation of two hundred cows are necessary to reach a consistent level of expertise. This individual training can be possible by final year extramural placements (Baguley, 2006) to prepare students for bovine veterinary practice. In this case, simulators, simulation models or other software like computer-aided learning packages (Bishop *et al.*, 2009; Bell *et al.*, 2010), and 3D visualization (Kinnison *et al.*, 2009) including Web-based interactive solutions (Petersson *et al.,* 2009), adapted to reproduction subjects can help to improve the preparation of students for these placements.

4. Conclusions

In conclusion, the reproductive tract palpation training in experimental university facilities appears essential for competence acquisition of future veterinarian, independently of their motivation.

In our case, we suggest an alternation of cows used for daily manual transrectal training purpose, regarding the animal welfare and student sensibility. Additionally, other resources like the abattoir and the assisted learn by computers can be used for a better implementation *curriculum* programs.

A great contact with the reality farms during the first three years will be necessary for a more accurate student choice regarding the optional Curricular Units in last semesters of the Veterinary Medicine courses.

The student motivation and expectation appears to be determinant factors to maximize their training.

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