

Lactococosis As A Global Practice Of An Epidemiological Study Using A Web-Based Application

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Abstract

Lecturers on Epidemiology of the Veterinary Faculty (University of Zaragoza) detected the need of a realistic example to illustrate all steps in an epidemiological study. Also we considered that in the next years there will be a great change in teaching-learning methodology in European Higher Education (as consequence of Bologna protocol) that forces to change the approach for training of future veterinarians that must to be able to carry out epidemiological studies with emphasis in detection of diseases, measurement of diseases and identification and evaluation of different risk factors. So, we have prepared a web-based application with individual access and data for each student of Epidemiology (2nd course) in order to provide a scenario where they must to visit 5 different trout farms, with more than 40 ponds and 30 000 trout included in a database. They must to design a sampling methodology (and to calculate sample size) in order to organize virtual visits to fish farms to collect fish in each pond. Every fish is incorporated in a the private database with data about characteristics of fish (specie, sex, age,...), pond (water temperature, turbidity, pH,...), population (density,...) and disease (lesions as exophthalmia, diagnostic of *Lactococcus garvieae* using PCR and DIF,...). With these data, the students can ask for absolute frequencies as contingency tables of one, two or three variables in order to use them with epidemiological software. Factors as costs and precision of results are used to evaluate the final results of each student, since we know the population parameters.

Introduction

Perhaps the Epidemiology is one of the complicated disciplines to teach in second course of Veterinary, because it need a good statistical background and previous knowledge on pathology and health at population level. Experience in this topic is uncommon among the students of Veterinary, so it is difficult to explain them how to investigate about problems in animal health, while they are not aware about the implications of different questions dealt during the course. Furthermore it is necessary to consider that in the next years there will be a great change in teaching-learning methodology in European Higher Education (as consequence of Bologna protocol) that forces to change the approach for training of future veterinarians that must to be able to carry out epidemiological studies with emphasis in detection of diseases, measurement of diseases and identification and evaluation of different risk factors. For all this reasons the Lecturers on Epidemiology of the Veterinary Faculty (University of Zaragoza) thought that a good alternative to illustrate all steps in an epidemiological study would be to carry out a survey in a high realistic scenario.

Design of application

As several classrooms with full informatic equipment with Internet access, are available in the Faculty of Veterinary, and also most of the students have personal computers with Internet access, we decide to set up a web server with all the applications for Epidemiology course as an integral approach to the new methodology. In the new paradigm lecturers should be to change from teaching to learning methodology centred in the students. So we have provide a system where the students can schedule their progress in the course with on line exercises for each chapter and each practical session. These exercises are automatically corrected in pre-established deadlines. We are trying to prepare a very intuitive interface in order to avoid problems with computer ability. Graphic design is minimalist to reduce loading times. All the system has been completely designed specifically for

this aim, and it has been upgraded during the second year with new functions in order to give more realism and to reduce dependence with external applications for intermediate calculations.

As part of this methodology, we have prepared a web-based application with individual access and data for each student of Epidemiology in order to provide a scenario where they must to visit 5 different trout farms, with 41 ponds and 30 699 trout included in a database that it is implemented in MySQL 3.5. The objective is that each student must to design a sampling methodology (and to calculate sample size) in order to organize virtual visits to fish farms to collect fish in each pond (a proportional distribution of the sample is suggested). The aim of this epidemiological survey is to estimate global prevalence of lactococcosis in trout farms of a region. An introductory text is provided at the beginning of the session (Figure 1), with a complete description of the distribution of farms (taking into account two species: rainbow trout and brown trout) and two production stages (pre-growth and growth). Also a extensive description of lactococcosis is provided as PDF document, with aetiology, photographs of lesions, diagnostic techniques and so on. Instructions about how works the system are included at the beginning of this screen.

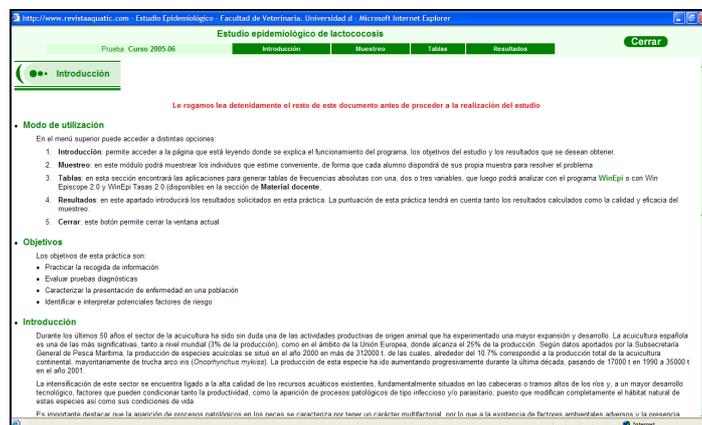


Figure 1 View of introductory screen



Figure 2 Sequence of screens corresponding to sampling process

When students design the sampling methodology then they visit fish farms. It is necessary to consider that they have got a budget, and every visit to fish farms costs 50 euros (as travel costs),

every sampled pond costs 100 euros (as water analysis costs) and every sampled fish costs 20 euros (as diagnostic costs) (Figure 2). Finally every fish is incorporated in a the private database with data about characteristics of fish (specie, sex and production stage), pond (water temperature, turbidity and pH), population (density) and disease (lesions as exophthalmia, diagnostic of *Lactococcus garvieae* using bacteriology, PCR and direct immunofluorescence). With these data, the students can ask for absolute frequencies as contingency tables of one, two or three variables (Figure 3) in order to use them with epidemiological software as WinEpi. With the results of these contingency tables (expressed as absolute values) they must to apply concepts explained in practical sessions, so they integrate them in a real situation.

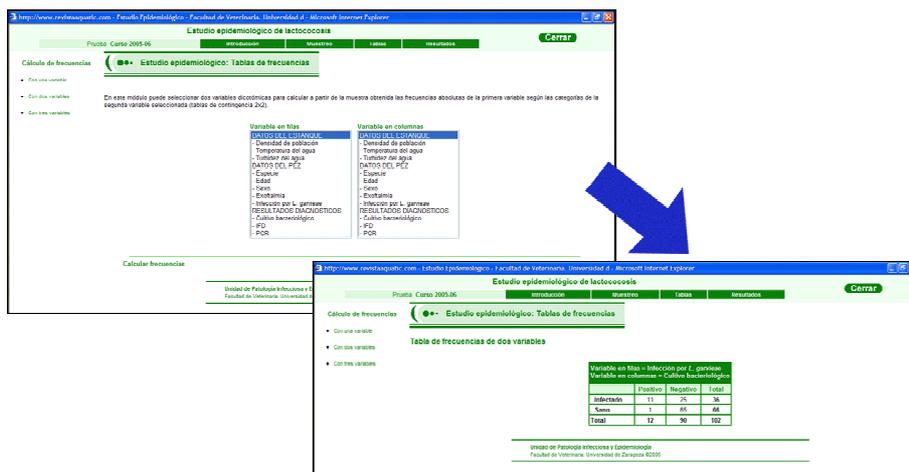


Figure 3 Sequence of screens corresponding to table calculation

Factors as costs and precision of results are used to evaluate the final results of each student, since we know the population parameters (Figure 4). Since not only the calculated values has used to evaluate the students, the sampling methodology is also taking into account as parallel evaluation using a chi-square test to detect if structure of sample is agree with foreseen distribution, and also to know if some real values (global prevalence for example) are included in confidence interval of the estimations carried out with dataset of each student.

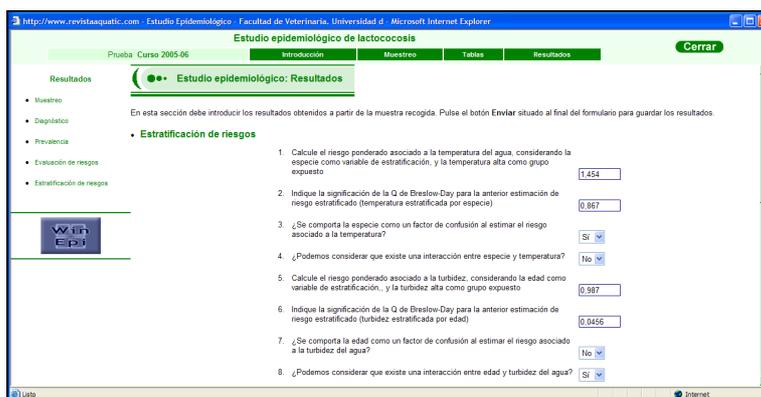


Figure 4 Screen corresponding to results introduction

For the moment, the students have appreciated the system and the effort of lecturers to provide a real example where they can develop a complete epidemiological survey.

Acknowledgments

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