



USING CASE STUDIES IN TEACHING IMPACT ASSESSMENT

Environmental systemic vision on swine production

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Summary:

The case study is an important tool to teach environmental impacts. It is important to train students integrating theory with practice from a systemic viewpoint. To teach this method we have used the case of the primary sector of swine production in Argentina. Owing to this technique, it is possible to tackle a systemic view to solve complex situations and the students acquire relevant knowledge.

Introduction

The case study is an important tool to teach environmental impacts in all its different aspects.

According to Amat (1994: 97), the main objectives of this case study are to train students so that they can identify problems, analyze situations and search for possible options or solutions. Furthermore, another goal is to foster students' abilities for decision making, for integrating theory and practice, for team work and good communication skills.

A case study is a learning method about a complex situation; it is based on a comprehensive understanding which is achieved through the description and analysis of a situation as a whole and within its context. In this particular case, we will emphasize the importance of a systemic view to identify the environmental impacts and its mitigation measures.



For this case study, a confined pig production located in a field in Carlos Pellegrini, Buenos Aires province, Argentina- has been chosen.

Special emphasis will be placed on aspects and impacts, which have not been yet extensively studied in Argentina such as impacts caused by aspect, dead animals direct and indirect impacts.

Environmental impact is an adverse effect caused by humans activities and the environmental aspect is an element of all the activities, products or services of an organization that can cause an environmental impact

This case study has been used with certain variations though, for two different courses of studies: Environmental Science and Agronomy at Faculty of Agronomy, University of Buenos Aires. The aim of using this case study was to teach “Environmental Impact Assessment” and “Environmental Management” in the pig production.

In the case of Environmental Management, the primary aim was to find solutions to environmental problems by means of new information that may help develop management protocols at a farm scale.

As regards the pig sector in Argentina, it has natural and sanitary conditions for growth and exportation. The swine chain has increased considerably in the last years and it has many chances of increasing its local consumption and replacing importations.

According to data published by the Ministry of Agroindustry (2018) during 2013-2018, production increased around 49% (416.442 to 620.549 tons of beef with bone respectively. In the same way, meat consumption has increased from 10.40 to 15.21 kilos per inhabitants yearly. Based on statistics (2012-2017) provided by



the Agro industry Office on swine production, in 2017 the stock production was around 5.119.438 with an increase of around 49% in comparison with 2012.

In figure N° 1 it is possible to observe that the distribution of pig stock is located 70% in Buenos Aires, Córdoba, Santa Fé and Entre Ríos and, according to the same source of information, in 2017 they stood for 82% of slaughtered animals. The four provinces above mentioned stand for 24, 6% of the whole country and they represent 58, 24% of the population.

This sector is made up of a great number of farm producers with a low number of sows in production. 73% of pig producers has a low percentage of sows and send to slaughter 8% of the national production. The remaining 27% are confined system producers and send 92% of the production to slaughter. In general, in this production group, the shelters refer to confined systems with a high technology level and they are part of the industrial stage...

Other reasons for choosing this case study are:

- The important contribution for teaching purposes this case study provides,
- Lack of unified environmental laws at a national level.
- Lack of environmental management on farms.
- Lack of opportunities students have to visit these productions on a regular basis because of biosecurity problems .Therefore, students require solid information and proper training.
- Experts in this field in collaboration with students will write a handbook on good practices.

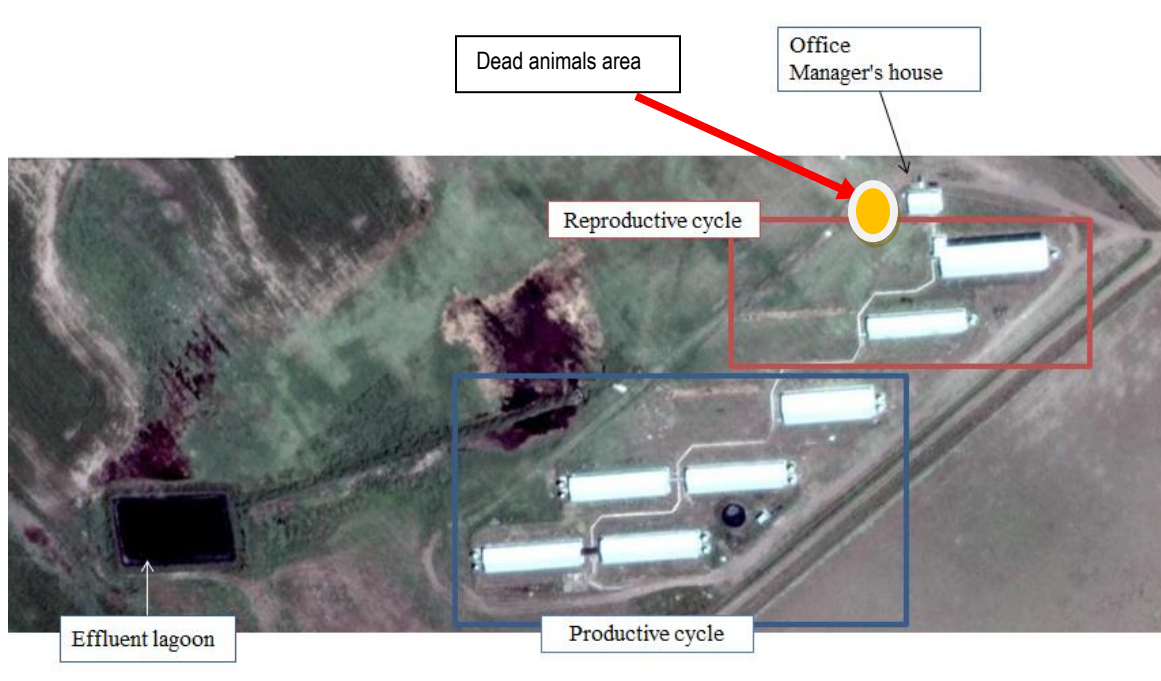
Objectives

1. To describe how to use the case of a confined pig farm, its variables and context, to teach environmental topics especially to identify existing and potential environmental impacts from a systemic view .
2. To describe a didactic method and students learning results.

Case study

The swine production is carried out in a confined system in enclosed places; all the cycles in one place .and with about 240 mothers. The field is located in a plot of land of around 10 acres in the south of Pellegrini (Buenos Aires Province).and it is surrounded by other crops and farms.

Photograph N° 1. Satellite image of the farm



Source of information: Material based on photographs taken in the swine production.



As regards the construction site, it is made up of seven shelters with an east west orientation which allows on the one hand to reduce some hours of sun exposure and, on the other hand, a suitable ventilation.

Two of these shelters are used for the reproductive cycle: one for sows' pregnancy and the other one for lactation and the other five shelters for the productive cycle: one for pig raising and the other four for fattening (Photograph N°1)

The floors of the shelters are called slats and they allow urine and faeces drainage towards the lagoon area. Effluents are produced together with animals' urine, faeces, food left overs, water remains with antibiotics that lead to that lagoon.

These lagoons do not exhibit waterproofing system.

During this process, there is animal mortality. These animals are placed in an area near the enclosed places without treatment.

Vectors control (flies, rodents, etc.) is carried out both in the reproductive and fattening cycle through baits strategically placed in shelters.

The productive process is weekly performed as follows: sows are separated in twenty groups depending on its physiological state and, in this way, weaning may take place on a scheduled date; thus managing groups of pigs in an individual way. This means that each group has 12 sows that find themselves at the same physiological state.

In the shelter for *mating and pregnancy*, there are about 204 sows and 4 boars. The supplies used in this shelter are cannulas, catheters, gel, lubricants, paper, bottles for semen, white soap, food (rations of food placed in bags for male and female pigs), disinfectants, water. There are also disposable materials such as syringes, needles, jars, etc



In the *maternity* shelter, there are 96 sows with its piglets. (An average of 12 piglets each sow) Lactation lasts around 21 days. The residues produced in this stage are dead animals during lactation, bags with rations of food given to piglets, piglets' testicles, and tail dockings.

On Thursdays, around 130 piglets and 12 sows that are part of the group are weaned. 21-day piglets and with a weight of around 6 kilos are transferred to a shelter for rearing. This is the beginning of the productive cycle. This stage lasts 49 days and when the process finishes piglets is weighting around 30 kilos.

From here onwards, they are taken to fattening shelters and they stay there for about 98 days till they reach a weight of around 112 kilos- the approximate weight required to be sold to the refrigerator chamber. These shelters do not have temperature control system; therefore, on hot days ammonia gas derived from effluents such as urine, faeces, food is expelled.

Rearing and fattening shelters are able to hold about 910 and 1700 animals respectively.

The soils in the production area are not suitable for continuous cropping and about one-third of the soils is suitable for agriculture and cattle rearing. About 70% of the area is used for cattle -rearing and the rest for crops such as sunflower, maize, and, on a smaller scale, soybean, wheat. In addition, sorghum grains. (SAG y P, 2006)

As regards climate, average rainfalls per year reach about 700 mm and the winds come mainly from the south and with greater intensity during spring.

The farm is located in an areic- type basin with few sweet water reservoirs; these being the only water resources available for human development but they display certain problems as regards quantity and quality. Ground water has



A high percentage of arsenic, nitrates and salinity. (Aqueduct northeast area of Buenos Aires Province 2019)

Method

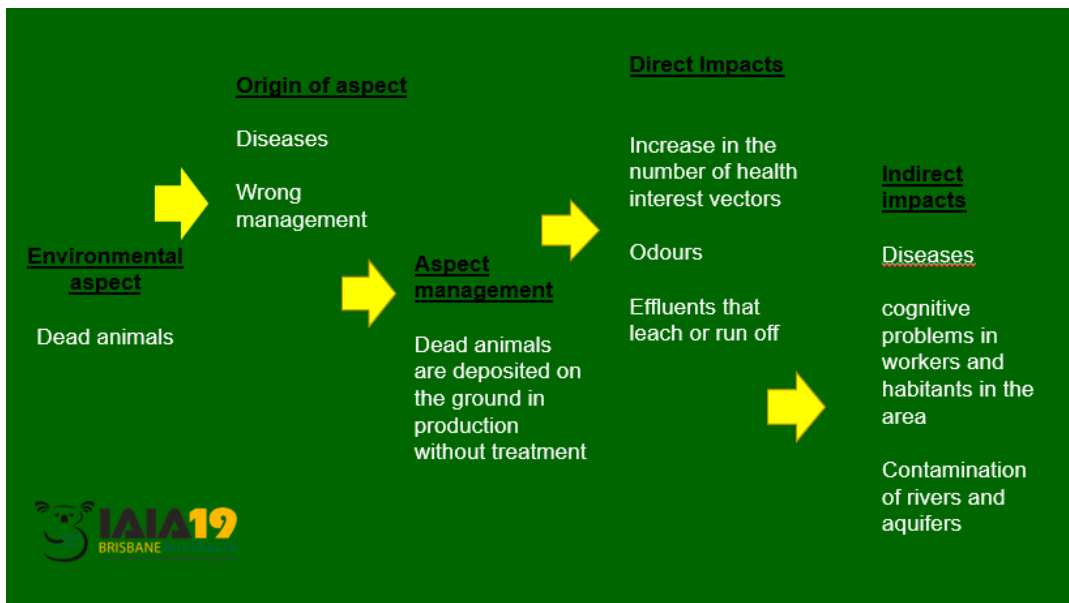
The method chosen consists in teaching and applying key concepts to analyze the case and to build knowledge such as system, impact, types of impacts, aspects, environmental management, project actions, and cause-effect relations, types of methodologies to identify impacts and its advantages and disadvantages.

Teaching strategies

Once the case study is analyzed from a systemic viewpoint, students will make a flowchart with all the information found. The flowchart will show the relationships between dead animals aspects, its management with the direct and indirect impacts. Hence, students learn a method to tackle these types of problems and find a solution.

The technique used in these courses is teamwork (groups of 3-5 students) After making the flowchart, students make an oral presentation and then they discuss the results with all the class.

Figure 3: Flowchart to identify environmental impacts from dead animals aspect.



Source: Conclusions derived from the analysis of the case study

Conclusions

Owing to this technique, it is possible to tackle a systemic view to solve complex situations. Thus, students acquire relevant knowledge. In many cases, students need basic information, which is not always available; therefore, it is necessary to conduct an investigation.

It is important to take into account that during the semester, students learn other methods such as the use of matrixes among other types of methodology.

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