ENVIRONMENTAL POLLUTION FROM INTENSIVE LIVESTOCK BREEDING

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Abstract
In recent years, meat production has increased due to high demand in the market. To meet the demands producers have expanded the growth and development of farms. Farming and the meat industry is one of the leading causes of pollution and massive exploitation of resources. The animals, often bred in an intensive way, contribute mostly to greenhouse gases and climate change. Therefore, agriculture and livestock are the main causes of environmental pollution and also the consumption of meat. In particular, it is estimated that 18 percent of worldwide annual emissions of greenhouse gases are attributable to cattle, buffalo, sheep, goats, camels, pigs and poultry. The study shows how to pollute are primarily intensive livestock farming, the way in which they are carried out and the substances contained in the meals of the animals themselves.
Keywords
agriculture, intensive livestock farming, pollution, environment, sustainability

Introduction

Given that farmers manage almost half of the EU land, the agricultural sector is a pressure major source on the European natural environment. In the last five decades Common Agricultural Policy (CAP) has encouraged this sector to become more intensive, representing the globalization with the highest growth in the world economy. Therefore, the agricultural sector is responsible for pollution (water, air and soil). Moreover, a substantial increase of worldwide meat demand require the use of about 70% of global arable land for livestock and livestock forage. Pollution is the contamination of the environment with materials that interfere with human health, quality of life and natural ecosystems function. Pollution of the environment is the result of natural causes, but most of the pollutants comes from human activities. The impact of meat production on climate change is highlighted as follows:

- Meat production lead to emissions of nitrous oxide and methane, these are greenhouse gases more powerful than carbon dioxide.
- Global meat production has grown more than double since 1970, and is expected to double again by 2050.
- Grazing and food needs for meat the production at large-scale lead to deforestation.
- Livestock industry uses disproportionally land, fresh water and energy, and is a major cause of pollution in the world.
- Livestock sector is one of the major contributors to the serious environmental problems, from local level to global.

Thus, effort to produce bigger results at a cost as low as possible was supported by the use of antibiotics and pesticides for mitigation of the spread of diseases caused by overcrowded living conditions on farms. Mutilation and unsanitary conditions are considered common industrial practice. According to the Worldwatch Institute, 43% of beef is produced by these methods. On the other hand, agricultural farms use enormous amounts of water and energy and waste created are causing pollution of soil, water and air. To produce 1 kg of beef it takes about 8 liters of oil to 18,000 liters of water. Cattle are responsible for 16% of the methane (a greenhouse gas) in our air and, furthermore, 1 kg of animal protein is equivalent to from 3 to 15 kg of protein from plants. According, the World Health Organization, more than 50% of the antibiotics produced are used in livestock farms. Farm animals considered most pollutants are in order: camels, cows, sheep, pigs, poultry.

1. Effects of intensive agriculture

The Danon (2006) notes that the evolution of human history even with the introduction of technology has tried to get the most with the least investment in the exploitation of land for the production agriculture. 70% of agricultural land and a third of the world land surface is used to raise animals and grow feed, compared to only 8% intended to crops for human use (Anti-Vivisection League Report, 2012). This means that we use the most of land to feed an animal that will give us back transformed only 10% of the amount of food ingested (Veronesi, Parrot, 2011). The Tab. 1 shows how many kg of vegetables need for growing an animal to obtain 1kg of meat we buy at the supermarket. Although the amount of protein of 1kg of meat is not equivalent to that contained in 1kg of plants, the effectiveness of conversion of vegetable protein in animals by the beef is only 6% and that to produce 50kg must eat even 790kg of vegetable protein. In addition, cultivation and livestock need water an increasingly scarce commodity. To produce 1 soy hamburger are needed 160l of water. To produce the same amount of veal we consume 1000 liters (Ercin, Aldaya, Hoekstra, 2011). In the report presented at World Congress on the water by the Stockholm International Water Institute, in cooperation with the Potsdam Institute for Climate Impact Research (PIK) it says there will not be enough water available to produce food for the estimated population in 2050 if we follow the current Western eating habits that include 20% produced calories from animal protein, a percentage far higher than the recommended amount of protein.

Table 1 Kg of vegetables to growth 1kg

Animals	**Kg of vegetables to growth 1kg**	**Kg of vegetables for 1kg of meat** (counting 35-40% of slaughter waste)
Veal	13	18
Beef	11	15
Lamb	24	33
Pork	4,3	6

However, there will be enough water if the proportion of animal food is limited to 5% of total calories with a food trade based on a well-organized and reliable, which we have not at present (Stockholm International Water Institute, 2012). We could grow many more vegetal with which to feed many more people. In fact, one third of the cereals grown in the world and 90% of soybeans are now destined to animal feed (Ercin, Aldaya, Hoekstra, 2011). We wouldn't witness so to the paradox to which part of the world is starving and another part gets sick and dies because they eat too much and eat badly and to do it takes away the land and food to others. Table 2 makes it clear how much water is used depending on the food that is produced.

The problem, however, also affects the quality of the environment that is seriously endangered by the heavy contribution in terms of pollutant of meat production in intensive farming. In fact, the FAO considers that emissions of CO_2 (carbon dioxide) from the meat production is equal to 18% of global ones. To produce 1kg of beef we emit the same amount of CO_2 to produce 75kg of broccoli!

Table 2 Liters of water/CO_2 needed/emitted to produce 1kg of certain foods

Food	Liters of water	Food	CO2 emissions / kg
1kg Corn	900	1 broccoli or cauliflower	0,185 kg of CO2
1kg Rice	3,000	1 liters / kg of milk	2,4 kg of CO2
1kg Poultry	3,900	1kg chicken meat	3,6 kg of CO2
1kg Pork	4,900	1kg of pork	11,2 kg of CO2
1kg Beef	15,500	1kg of beef meat	28,1 kg of CO2

The relationship between how much a food is healthy and its footprint on the environment is indirectly proportional. What we ought to eat more has a low environmental impact while what we should avoid has a remarkable polluting footprint. The level of these emissions is due to the fact that there are many more steps than the production of crops for human consumption, due to the transport of feed, animal slaughter, of the meat in distribution. And speaking of transportation, this is a useful mirror that reflects the impact of our diet in the facts km by car:

Table 3 Greenhouse effect generated by different eating habits per capita per annum, expressed in car km

	Organic	Conventional	Conventional, without beef
Feeding vegetarian without meat and dairy products	281km	629km	
Style food without meat	1978km	2427km	
Style food – omnivore	4377km	4758km	4209km*

* Beef replaced by pork

**average consumption of individual products in Germany, 2002 - Eurostat; km with BMW 118d model with 119g CO2/km.

Source: Dossier of Foodwatch "Klimaretter Bio?", Germany, 2008.

The consequences in terms of climate change are well known and documented. The animal breeding sector emits 37% of the methane gas (co-responsible for the greenhouse effect), 65% of nitrogen oxide (especially from organic waste), 64% of ammonia emissions (responsible for acid rain and acidification of the ecosystems) (OECD, 2002).

As mentioned, 70% of agricultural land and 30% of all land is occupied for the production of feed intended to farms animals or farms for themselves. These figures are also connected to deforestation or reforestation failure for the change of use of land if previously used for other purposes. In fact, agriculture and deforestation together contribute to one third of global emissions of CO2. In particular, the FAO estimated that emissions from deforestation to make way for crops is responsible for 2.4 billion tonnes of emissions each year (LAV, 2012). n addition to the production of carbon dioxide and co-responsibility aggravation of the greenhouse effect, deforestation also produces desertification in dry areas, erosion, landslides and mudslides in the rainy and hilly lands, pollution of aquatic ecosystems (due to run-off water), and in the interests of fair-trade market that is gaining increasing ground, misappropriation of resources for indigenous peoples. These are just some examples of the impact of intensive farming. The "psychological" reason of a great change in mass is that the danger is not perceived properly. But, besides this, is added a poor information on the subject.

2. The impact of intensive livestock on environmental resources

To get an idea of the resources used by intensive agriculture, according to FAO, livestock produces 18% of greenhouse gases that trap the heat of the atmosphere, and this determines the melting ice caps, rising sea levels, natural disasters, thinning of the ozone layer, constant and increasing desertification. This leads to humans a higher resistance to antibiotics, new viral diseases (eg. influenza epidemics), damage from pollution, shortage of land for the production of food for human consumption and increase of land for the production of animal feed, greater poverty of farmers who live by subsistence, increased incidence of diseases related to excessive consumption of fats and animal proteins, including cardiovascular disease, cancer, diabetes, hypertension, obesity. The intensive breeding then pollutes soils, waters and seas, contaminating nature with potentially deadly toxins. The meat is in fact one of the products more expensive, inefficient and pollutant with a very high consumption of resources. When we talk about sustainable development, we should also report to the diet of the opulent societies, rich in this hyper-protein food but also to the method of intensive livestock farming to increase productivity and profitability, to overcrowding and to the poor living conditions of animals. This is an unnatural way to raise animals that generally the exploitation of environmental resources so often indiscriminate. Among the reasons to consider the production of meat harmful to the eco-system are:

1. *Soil degradation* **-** The intensive rearing of animals is largely responsible for the erosion of the soil that can produce degradation and desertification of the environment.
2. *Deforestation* **-** For example, the current situation of the Amazon rainforest, where 88% of the deforested land has been used for grazing, in Brazil, according to data provided by the CIFOR- Center for International Forestry Research Institute and INPE-for Space Research of the Brazilian government, in just 6 years (from 1997 to 2003) saw a 600% increase in beef exports, mainly to European countries.
3. *Chemical pollution* - Even the pollution of soil and water can be traced back to intensive farming of livestock and the massive exploitation of the land for monocultures to feed animals. According to FAO statistics, 50% of the world production of cereals and 90% of the soybean are intended for livestock feed.
4. *Power Consumption* **-** The production of meat, especially beef, is based on an inefficient system: the economist Lappé (1982) calculated that in just one year in the United States were produced 145 million tons of grain and soybeans, from the processing of which were obtained only 21 million tons of meat, milk and eggs. The disproportion between the quantity used and the final quantity allows us to see how 124 million tons of food have been wasted, taking away the possibility for millions of people on the planet to have a full meal a day.
5. *Water consumption* **-** Consumption of water for the production of cereals and feed for animal use, watering the animals and cleaning the stables, is the biggest drain on the world's water resources with profound impact on the economy of the planet's resources. Therefore, to produce just 1 kg of beef required 16,000 liters of water (Ercin, Aldaya, Hoekstra, 2011).
6. *Disposal of droppings* - Intensive livestock farming have difficulty disposing of droppings of cattle compared to traditional farming, which would represent a resource of soil fertility. It is evident that the enormous amount of excrement not assimilable by the soil produce real environmental disasters and unhealthy conditions of the environment.
7. *Global warming and acid rain* **-** The animal droppings directly produce greenhouse gases as a byproduct of digestion; in particular in the case of cattle this is a highly polluting gases such as

methane. Some studies have revealed that the high ammonia content of the droppings of animals bred may underlie the phenomenon of acid rain.

According to a study by Barilla Center for Food & Nutrition, the environmental impact of any inhabitant of the Earth who consumes a meal of meat a day is like 37 tennis courts every year.

According to the report on *The actual costs of the production cycle of the meat* of the League antivivisection (LAV, 2012), the zootecnia is the third largest source of pollution after the industrial installations or energy and transport.

3. Research Methodology

The research methodology involved the creation of an emission inventory, starting from the census of emissive sources that allows to identify the different types of pollution sources in the territory of Cuneo Province. So we moved to the data collection, estimated or measured, relative to the amount of pollutants introduced into the atmosphere by each emissive source.

Regarding water pollution was taken into account nitrates produced by the release of nitrogenous substances in the surface aquifers by the farming of livestock but also from the use of fertilizers on agricultural land. As regards air pollution, the major impacts come from emissions of ammonia (NH_3), methane (CH_4) and nitrous oxide (N_2O) (De Leeuw, 2002). The ammonia emissions from agriculture are primarily produced by intensive agriculture and livestock farming. By comparing the measured values with those ISPRA, it appears that the ammonia produced by the agricultural sector represents 95% of total emissions at the national level of this gas, of which 59% comes from the livestock sector. Nitrous oxide from agriculture represents about 61% of the emissions of this gas at the national level, of which 12% comes from the dejections from the livestock sector. The methane from agriculture represents 40% of total emissions at the national level, which in this case are primarily derived from zootecnia.

4. Livestock farms and environmental degradation

4.1. Collection and organization of spatial information related to livestock farms

The following image shows the location and type of animal bred for all farms where it was possible to retrieve the information. The work of construction of the geographical system has been carried out using the open source software QGis. Farms considered in this study account for about 85% of the animals reared in the province. n the picture we can see that farms are almost entirely concentrated in the lowland area and that the greater number of these businesses are breeding cattle. The available data retrieved from the Agricultural Registry Office, updated to 2011, refer to companies 4,837 of small, medium and large size farming livestock with n. 417,418 heads, fig. 1.

4.2. The pollutants considered and their origins in livestock farming framework

NH_3 **-** The ammonia comes in large part from agricultural fertilizers and the very common practice today of intensive livestock. Once emitted, ammonia remains in the atmosphere for only a short period of time, but produce serious effects on animals, plants and air quality. Ammonia emissions from the agricultural sector as well as having an important role as a precursor of greenhouse gases such as nitrous oxide, also contribute to the formation of particulate matter (PM10).

CH_4 **-** In the case of intensive livestock, the formation of CH_4 is derived from the digestive processes (enteric emissions) and the anaerobic degradation of droppings borne by the organic matter present in them during storage before agronomic use. Methane is a potent greenhouse gas and is characterized by a global warming potential of about 25 times higher than that of carbon dioxide. The CH_4, therefore, plays an important role in raising the earth's temperature.

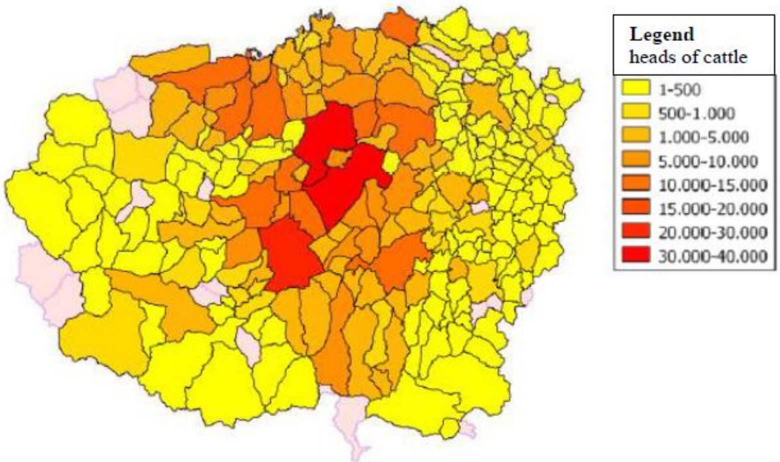

Fig. 1. Total number of cattle reared localized per municipality

***N_2O* -** Within the zootechnical, the main sources of emissions of N_2O are constituted by the storage and spreading of livestock waste on the ground and as well as directly by the contribution of droppings on land by the grazing animals. The pollutant N_2O can be produced during storage as a result of partial nitrification and subsequent denitrification of wastewater and the amount of release depends also on the storage system adopted. Nitrous oxide is a greenhouse gas, although it is found in small quantities in the atmosphere, but it has a global warming potential of about 314 times that of carbon dioxide, and its presence in the air is increasing.

4.3. Emission factors

For all livestock farms were calculated the emission values, expressed in tones produced annually, for the following pollutants: ammonia (NH_3), methane (CH_4), nitrous oxide (N_2O). To calculate the values of these emissions were used: the number of animals raised in every cattle farm; emission factors relating to each specie considered pollutant, expressed in kg/head/year. In these calculations were also considered the different categories animals: in fact, in the case of cattle, the emission values will vary depending on whether they are cattle, buffaloes or cows. Were calculated emissions of ammonia, methane and nitrous oxide from three distinct process steps, namely: from animal housing or relaying; from storage of livestock waste; by the spreading of livestock waste.

For relaying or animal housing means the emission produced by animals that are found in a confined space, such as byre, or fence, while the storage refers to the emission from the collection of zootechnic effluents, shoveled and non, intended for exploiting agronomical. For ammonia was possible to obtain releases from all three phases of the process, while for methane emissions were calculated for the stages of animal housing and storage of wastewater. Regarding the emission of nitrous oxide are considered together the phases of animal housing and storage of the wastewater, using a single factor, as not available in the literature of the specific factors for each phase. To determine the value of emission of N_2O from spreading was first calculated the amount of nitrogen excreted by each animal reared in the company, this value was subtracted from the estimated percentage losses of nitrogen in the form of NH_3 emission for each stage. The value obtained was then multiplied using an emission factor equal to 0.0125 kg N_2O-N/kg of N content in the material spilled (since IPCC). The following tables set out the values of the emission factors used for the three pollutants and for the three phases of the process involved, considered as the statistical "best fit" of the range of factors collected from the literature.

4.4. Study Results and comparison with emission inventories

The data of consistency livestock used for the calculation of emissions of ammonia, methane and nitrous oxide are indicated in tables 4,5,6.

Table 4. NH_3 emission factors

NH_3	**Relaying**	**Storage**	**Spreading**
	kg/head/year	kg/head/year	kg/head/year
Dairy cows	15,46	20,36	12,65
Bovines	6,66	8,96	5,46
Young buffalo	12,61	16,61	11,95

Table 5. CH_4 emission factors

CH_4	**Relaying**	**Storage**
	kg/head/year	kg/head/year
Dairy cows	113,24	15,04
Bovines	44,72	7,65
Young buffalo	69,74	11,96

Table 6. N_{2O} emission factors

N_2O	**Relaying + Storage**
	kg/head/year
Dairy cows	2,1497
Bovines	0,6683
Young buffalo	1,89

The values available in the regional inventory were calculated based on the livestock consistency, whose number of animals reared is shown in Table 8.

Table 7. Livestock consistency

Animal species	**Number of animals reared**	
	2011	**2007**
Dairy cows	53.461	66.055
Bovines	363.143	361.356
Young buffalo	814	677

In the Regional Inventory, however, the emissions are not distinguished according to the three phases of the process, but the value is expressed as the sum total and it is not therefore possible to observe which are the contributions of different pollutants for stage animal housing, storage and spreading of droppings. Only in the case of methane can be seen which one is the contribution that comes from the management of manure and that due to enteric fermentation, amounting to 11.878 tone/ year and 25,596 tone/ year respectively.

The calculated values show a good overlap with those found in the Regional Emissions Inventory, as can be seen in table 7. The value of methane, which appears in table 8, is given by the sum of the contributions due to droppings management and enteric fermentation, the latter, however, is not calculated for all the different animal categories. In Tab. 10 are shown the total annual emissions of ammonia, methane and nitrous oxide subdivided into the categories animal considered and obtained in this study.

Table 8. Total annual emissions of NH_3, CH_4 and N_2O, * from Regional Emissions Inventory (IREA)

Pollutant	**Tons/year**	
	2011	**2007***
NH_3	16.640	17.133
CH_4	34.529	37.474
N_2O	1.066	1.651

Table 10. Total annual emissions of NH_3, CH_4 and N_2O subdivided by animals reared, according Regional Emissions Inventory (IREA)

Animal species	**NH_3** (ton/year)		**CH_4** (ton/year)		**N_2O** (ton/year)	
	2007	**2011**	**2007**	**2011**	**2007**	**2011**
Dairy cows	3.203	2.591	8.454	6.858	337	204
Bovines	7.820	7.655	19.673	19.018	815	502
Young buffalo	29	34	56	67	-	3

Table 10. Comparing emission factors NH_3

Animal species	**IREA 2007**	**Case Study**
	kg/head/year	kg/head/year
Dairy cows	48,49	48,47
Bovines	21,64	21,08
Young buffalo	42,84	41,17

Table 11 Total annual emissions of NH_3, CH_4 and N_2O subdivided by process steps

Animal species	**NH_3** from animal housing (tons/year)	**NH_3** from storage (tons/year)	**NH_3** from spreading (tons/year)	**CH_4** from animal housing (tons/year)	**CH_4** from storage (tons/year)	**N_2O** from animal housing+ storage (tons/year)	**N_2O** from spreading (tons/year)
Dairy cows	827	1.088	676	6.054	804	115	89
Bovines	2.419	3.254	1.983	16.240	2.778	243	259
Young buffalo	10	14	10	57	10	2	1

From Tables 9 and 10 it can be observed that the values do not differ much, because the Livestock consistency does not change too much from year to year. In inventory IREA are

used coefficients that are substantially equivalent to those obtained by summing the emission factors used in this study, related to each stage of the process considered for the three pollutants investigated. If we compare, for example, emission factors used in the inventory IREA and in the present study (table 10), for the calculation of atmospheric emissions of ammonia, expressed as kg / head / year, are obtained values which, as we can seen in the table below, are superimposed.
The particularity of this case study is that of being able to divide the contributions that the different categories of animals have depending on the process step considered. Table 11 shows the values obtained. The values of emissions in the National Inventory and relative to the entire region of Piedmont (2005) indicate that the emission value of ammonia 22,890 tons/year, 62,839 tons/year of CH_4 and 2,144 tons/year of N_2O, table 12.

Table 12. Total annual emissions of NH_3, CH_4 and N_2O according National Inventory

Pollutant	Tone/year
NH_3	12.736
CH_4	33.427
N_2O	670

4.5. Analysis of data arising from the case study

In Table 14 is shown the contribution of each process step and each type of livestock has in the emission of NH_3, CH_4 and N_2O.

Table 13. Contribution emission NH_3, CH_4 and N_2O per process step

Pollutant	Bovines spreading (%)	Bovines storage (%)	Bovines housing (%)	TOTAL (%)
NH_3	**16**	**26**	**20**	**62**
CH_4	**-**	**10**	**65**	**75**
N_2O	**33**	**33**		**66**

It can be observed that cattle, in all the three phases of the process considered, are contributing to a considerable extent to the emission of these pollutants. Emissions of NH_3 are high for all types of livestock, since often the collection tanks and storage of the waste are not covered, while emissions of methane gas are particularly relevant in the case of cattle because, by their nature, ruminant, they emit gas during anaerobic fermentation that takes place inside of their second stomach. CH_4 emissions calculated for each phase of the process and for the three types of animals have been spatialized on the municipalities (table 13) in order to see which of them are characterized by greater emissive flows. We can observe that cattle rearing, mainly responsible for methane emissions account for 75% of total emissions calculated, and that these emissions are present in almost all municipalities in the province. The largest number of methane emissions (fig. 2) from cattle is located in the municipalities of Fossano, which has a total of 256 companies and Savigliano, with a number of companies amounted to 181.

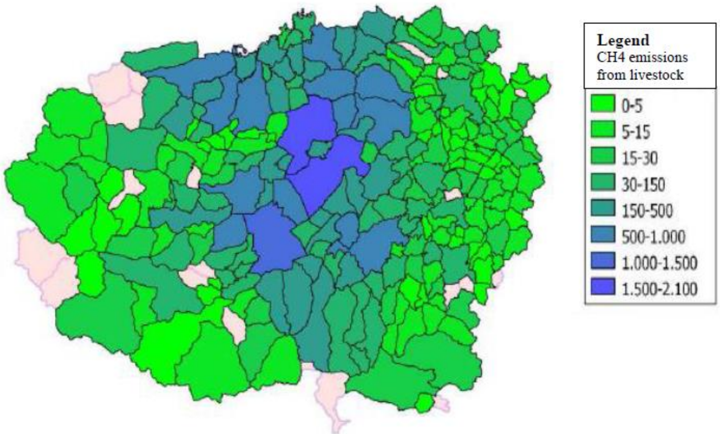

Fig. 2. CH_4 emissions from cattle livestock

Methane emissions from these two municipalities if we consider only the livestock farming, amounted to 1,928tons/year in the case of Fossano and amounted to 1,771tons/year for Savigliano. With regard to the annual emissions of methane gas the municipality with the most annual flow is Bra with a value of 300tons/year, followed by Racconigi with 271tons/year and Cavallermaggiore with a value of 264tons/year. For emissions of methane gas into the atmosphere, the municipalities are characterized by the highest annual flow of this pollutant are: Fossano with 2,753tons, Savigliano with 2,203tons and Cuneo with 1,265 tons. For the nitrous oxide, the highest values occur in the municipality of Fossano with 79tons/year, followed Savigliano with a value of 63tons/year and Cuneo with 35tons/year.

Conclusion

The results of this case study allow for a definition of emissions from livestock activities and mapping of the main livestock farms. The aim was to identify the emissions that come from animal housing, storage and animal waste. The knowledge of these data also allows to have a true estimate of the amount of pollutants emitted into the environment, which are useful in developing strategies for reductions or elimination of emissions from the livestock sector.

The data available to us, updated to 2011, refer to 4,837 to small, medium and large companies of livestock farming (417,418 head). The Piemontese cattle breed is the main Italian native breed for meat due to numerical consistency of cattle reared in Italy. It is a beef breed of medium size that converts forage very well in meat and gives high slaughter yields. The Piemontese cattle breed is distinguished by its high quality, the characteristics of which are given by the rusticity and morphological qualities, able to simultaneously meet the needs of farmers, butchers and consumers.

For all livestock farming were calculated the emission values of the pollutants expressed in tons per year relative to ammonia (NH_3); methane gas (CH_4); nitrous oxide (N_2O). In these calculations were also considered different categories of animal species. In fact, in the case of cattle, the emission values vary according to whether they are cattle, buffaloes or dairy cows, from the three phases of the process related to housing, storage and livestock waste.

The values obtained are significant for the study of the dynamics that regulate the formation and diffusion of pollutants to which Community legislation sets certain limits. Knowledge of the phenomenon and the assessment of the contribution of the livestock sector to environment pollution can act as a stimulus to promote the use of best available technologies to the greatest number of companies operating in the sector.

The value of production from the breeding of beef cattle in 2011 exceeded 3 and a half billion Euros. ISTAT has relied, in Italy, more than 200,000 livestock farms, and of these, only 7000 are organic. Even traditional businesses are becoming aware of the problem and with subsidies and incentives are increasingly using renewable sources to reduce their environmental impact (Novak, Drăgulănescu, 2010). Photovoltaic on the roofs of stalls, wind farms, and especially biogas for waste valorisation (sewage, food scraps and processing waste), guarantee the recovery of energy used for the production and remuneration of part generated in excess. In this way, livestock farming can diversify the risk, and increase profits becoming more "sustainable", at least from an energy point of view. The European Union has long been working to improve welfare level of animal life, both as regards the protection of all animals in breeding, and for the conditions of transport, stunning and slaughter.

In Italy most of the cattle is gathered in intensive farming. Between Emilia-Romagna and Lombardy over 700 members of Unipeg, cooperative in the slaughtering and processing of fresh beef, representing 10% of the national situation, have signed a production protocol in which are some standards to be met. From space available to each animal (from 1.50 to 3 square meters per head), which should allow everyone to lie down at the same time, to the replacement of air required to avoid excessive concentrations of ammonia and hydrogen sulfide. In addition, in the barns must penetrate the natural light and has been imposed for a minimum period of stay, to prevent the growth of the animals takes place too quickly. Were banned hormones and proteins in animal feed. Compliance with the rules, with pecuniary penalties even the suspension of production, is controlled by sampling from a third party (CSQA Certification). The aim is to achieve ever higher quality standards and to create a culture of compliance with rules relating to animal welfare and environmental impact. It would be appropriate that such a specification is extended to the national level and adopted as guidelines. Therefore, the only way to push transformation of sector and make it really more "sustainable", is that the consumer avoids wastage and choose certified meat and related traceability, which meet certain environmental parameters and animal welfare, inquire and reading food labels. However, it is useful to remember that many farms not complying with European legislation and still apply intensive farming or factory farming, which causes pollution. The consequences fall as well as on animals also on the environment, causing a depletion of environmental resources, the onset of disease and the aggravation of the greenhouse effect. The consequences in terms of climate change are by now well documented.

Some data used for this case study were provided by the Registry Office Livestock Farming and of Agricultural Registry Office of the Cuneo Province, in addition to ISTAT data, by elaboration and personal research.

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