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National Reference Centre
for the study and verification
of Foreign Animal Diseases

INDEX

EDITORIAL

The BENV as a tool for disseminating information

Dear readers,

the twelfth issue of Benv continues the journey on animal welfare, hosting in the space **Around us** an article on **animal welfare during slaughtering**.
The conditions for the animals during slaughtering have improved significantly starting from this year, with the entry into force of Regulation EC no. 1099/2009 approved by the European Council, which replaced –the Directive 93/119/EEC on the protection of animals at the time of slaughter or killing. New provisions are introduced for culling for sanitary reasons: killing of large number of animals is sometimes the only solution to eradicate highly contagious diseases (such as avian influenza or foot and mouth disease). Since this affects public money, these operations must be carried out trying to limit their costs, but respecting animal welfare anyway.

In the same section is present an article on the **publication of the atlas on health and climate**, a document combining data from meteorology with those on public health, thanks to a collaboration between the World Health Organization (WHO) and the World Meteorological Organization (WMO). This paper analyses the risk of emerging diseases in relation to climate changes and gives some examples on how the use of weather and climate information may be useful for protecting the public health.
Another article considers the most recent food safety incidents and crises, analyzing the **complexity of food trade**.
In the section **In recent months**, an article describes the spatial and temporal distribution of **classical scrapie in sheep** in Europe and in our country. On an European scale the prevalence of classical scrapie in sheep, specific by risk category, is equal to 14.5 and 7.1 cases per 10,000 animal tested, in those died in barn and regularly slaughtered respectively. Among the European countries, Italy is the most affected, with 685 outbreaks reported since 1995, mainly located in Sardinia and in the center Regions.
Finally, an article shows the activities undertaken by the veterinary services in conjunction with the National Reference Laboratory (NRL) for Dioxins and PCBs in the **management of the health emergency occurred at the "Ilva"** establishment in Taranto.

The **data on outbreaks and maps** show the epidemiological situation of animal diseases notified in SIMAN in the first quarter of 2013.
Benv welcomes your articles in the section **Submit Your Article**, where you will find details on how to send your article and information related to the drafting.
Looking forward to see your articles, we wish you good reading.

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Simona Iannetti
National Reference Centre for Veterinary Epidemiology, Planning, Information and Risk Analysis (COVEPI)

IN THESE MONTHS

The main events of epidemiological interest in the last months in Italy and in the European Union

Epidemiological data of classical scrapie in sheep: the base from which to combat it effectively

The presence of scrapie in our country dates back to 1976 but until 1991, the year in which it was included among the diseases subject to mandatory reporting, only 25 outbreaks were identified. Based on surveillance data now we know that scrapie in Italy is a very rare condition characterized **by low levels of prevalence but spread throughout the country**. A large outbreak, which occurred in the second half of the 90s, mostly in the central and southern Italian regions (Agrimi et al., 1999), contributed to the spread of the disease (Bertolini et al., 2012). Over time the management of the outbreaks led to the cull approximately of 250,000 sheep and 13,000 goats.

To evaluate the evolution of the scrapie epidemiological situation and the effectiveness of the measures taken, since 2002 an active surveillance program has been launched at the European Union (EU) level; the new surveillance paralleled the pre-existing passive surveillance based on the mandatory reporting of symptomatic animals; whereas active surveillance is based on the rapid tests on a large and representative sample healthy slaughtered (HS) or fallen stock (FS) sheep and goats. The greater sensitivity of **active surveillance** revealed that scrapie is much more widespread than expected and allowed to detect also in Italy, in parallel with the **"classical" form**, the **"atypical" scrapie**, reported in Norway since 1998.

Due to the nature of the transmissible spongiform encephalopathies (TSEs), unfortunately there is no possibility of making *ante mortem* diagnosis neither relying on vaccination campaigns. Nevertheless, as pointed out already in the 90s (Schreuder et al., 1997), the discovery of a genetics component of scrapie in sheep disclosed new management opportunities: in sheep polymorphisms at codons 136, 154 and 171 of the prion protein gene PRNP influence the resistance to the disease which reaches its maximum for the carriers of the haplotype $A_{136}R_{154}R_{171}$. The genotype allows to distinguish **genotypes resistant, and susceptible semi-resistant animals** and select the population on the basis of these characteristics. So, in parallel with the cull of the animals in the outbreak, the **selection** has become the most effective and practical strategy for the control and eradication of classical scrapie in sheep (Hagenaars et al., 2010). Based on EU Regulations, Italy has launched its own national breeding plan in 2005.

The results of the monitoring activities and in particular the data on the space-time distribution of scrapie may be very helpful in assessing the effectiveness of the strategies for the control of the disease. However the application of surveillance is often heterogeneous affecting its sensitivity and making hard the interpretation. The aim of this paper is to describe the spatial and temporal distribution of classical scrapie in sheep in Europe and in our country in order to set an effective strategy to contrast the disease and, subsequently, to verify the effectiveness.

The **data collected between 2002 and 2011** and available within the annual reports that the European Commission (EC, 2002-2012) published over the years have been used to describe the temporal and geographical distribution of scrapie in EU. With regards to Italy, the official data of the information system of scrapie surveillance have been used. The occurrence of the disease was characterized in terms of prevalence and, for Italy, also of incidence. The prevalence was calculated as the number of cases identified though active surveillance, per ten thousand tests, whereas the incidence in terms of number of new outbreaks per ten thousand flock/herds at risk. The trend of the disease has been based on prevalence data coming from active surveillance (2002 - 2011 at the European level, 2002-2012 at Italian level). With regards to our country, the annual prevalence rates were standardized on the variables (age group and risk category i.e. FS Vs. HS) able to affect the probability of disease detection using direct standardization.

In the 27 EU member states over the 2002-2011 period a very large number of sheep and goats were submitted to monitoring: respectively over 2.1 million FS and about 2.7 million HS small ruminants. However, in some of the countries, active monitoring has been initiating since 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland) or even later (Romania). The proportion of the tests applied to the two risk categories (surveillance streams) varies greatly between countries, with the result that the sensitivity of case detection is probably very different from country to country.

Restricting to active surveillance on sheep, about 5000 cases of classical scrapie (plus 1400 cases of atypical scrapie) have been identified at European level . Only four countries (Latvia, Lithuania, Luxembourg, Malta) have never detected TSEs of small ruminants, while only atypical scrapie cases were reported in a second group of countries (Austria, Denmark, Estonia, Finland, Poland, Sweden).

On an European scale, the stream specific prevalence rates of ovine classical scrapie, obtained thanks to active surveillance, are between 14.5 and 7.1 cases per 10,000 in FS and HS respectively (with a greater probability of disease equal to 2 times).

Italy is among the most affected countries: apart from the situation in Cyprus, where there was a huge epidemic (462.5 cases per 10,000 tests over the entire period), generally in the rest of the EU the prevalence in sheep varies between a few units to a few dozen cases per 10,000 tests and with much lower values in goats. The map shown in Figure 1 gives a clear, albeit coarse, epidemiological snapshot (in terms of crude prevalence) of the impact of the disease in Europe.

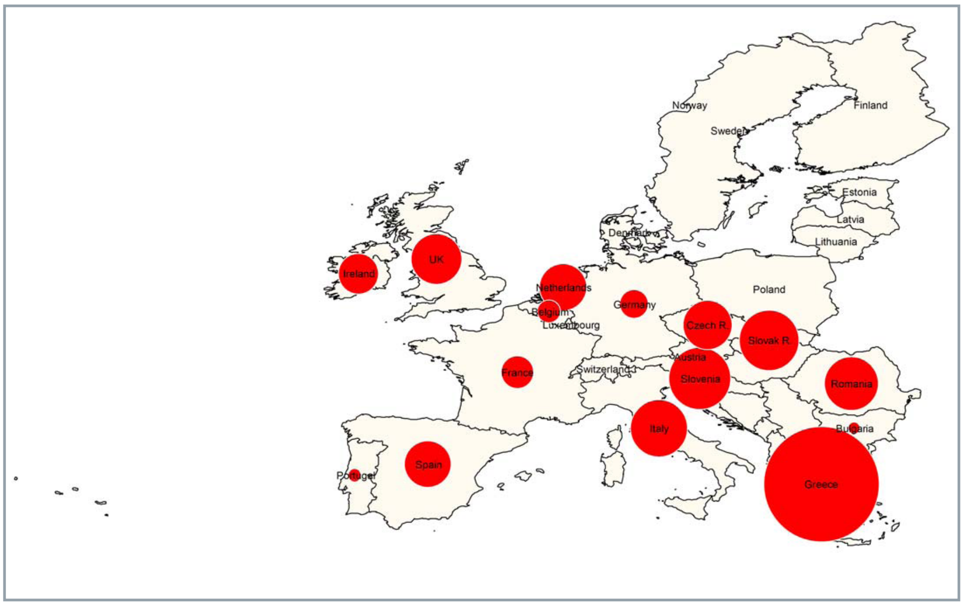

Figure 1.
Classical scrapie in sheep, crude prevalence rates (cases per 10 000 tests) by country over the period 2002-2011, excluding Cyprus. The range of values is between 0.7 (Bulgaria) and 61.3 (Greece)

With regards to the temporal evolution of the epidemiological situation, each country has its own story (fig. 2) and the data do not convey a general common trend .

In Italy since 1995 **685 outbreaks were identified**: most of the outbreaks has been detected after the start of active surveillance in 2002 (212 through passive surveillance, 473 though the active one, respectively). Goats have been hit very marginally involving only 73 herds (10.7% of the total number of outbreaks).

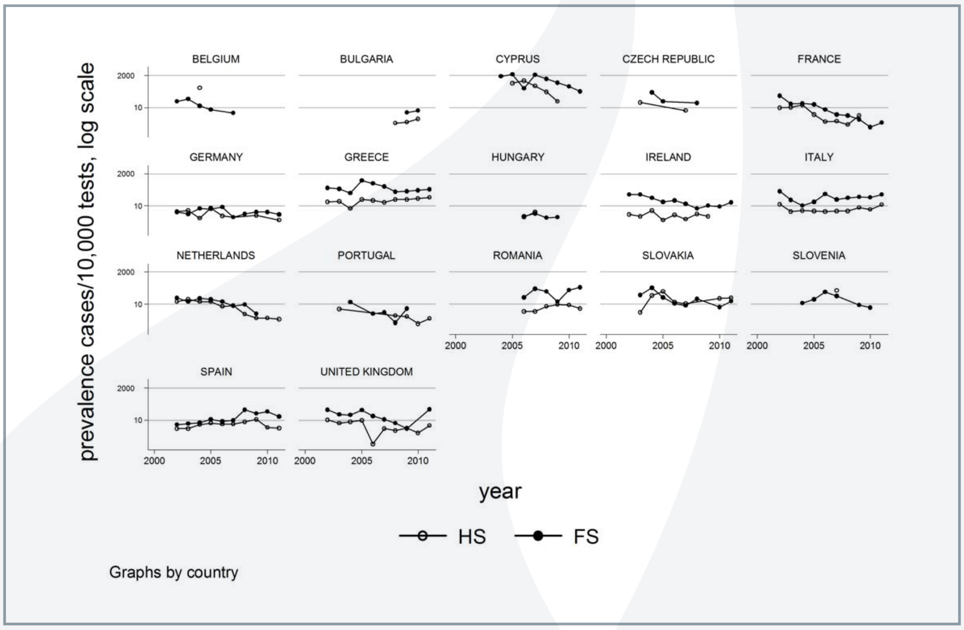

Figure 2.
Classical scrapie in sheep, stream specific prevalence rates (cases per 10 000 tests) by country over the period 2002-2011

Figure 3 shows the epidemic curves of classical scrapie in Italy: the trend of the curves reflects not only the evolution of the epidemiological situation but that of the legislation which, over time, led to changes in the number of animals to be tested (Figure. 4).

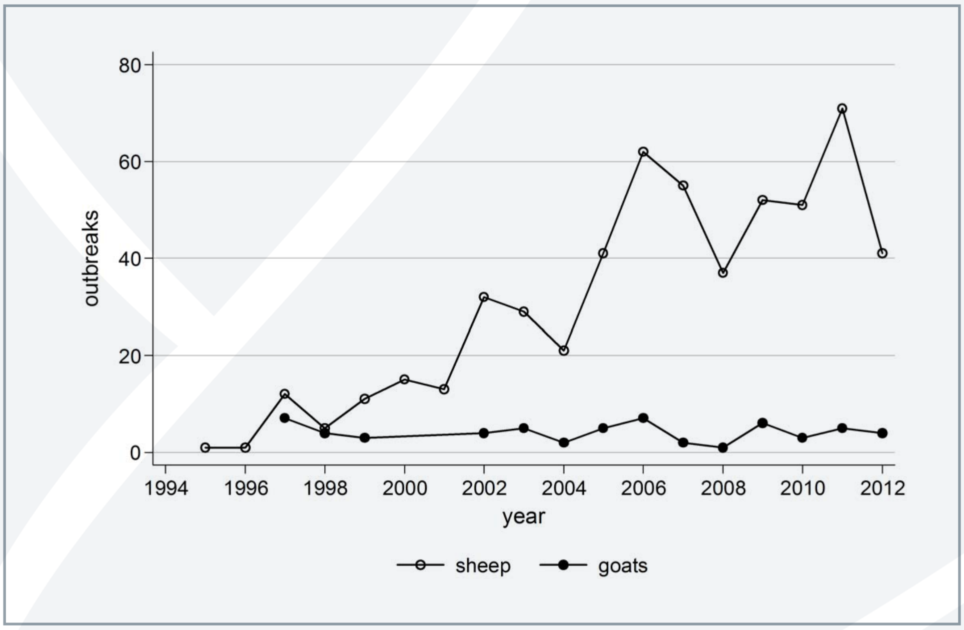

Figure 3.
Epidemic curves of scrapie in Italy in the period 1995-2012. The curves show the number of outbreaks per year and by species involved

The geographical distribution of the incidence over the entire period 1995-2012 (Fig. 5) is very heterogeneous, with Sardinia and Central Italy particularly affected and an overall involvement of the country. In general, for both species it is not possible to appreciate an improvement of the epidemiological situation at national level as suggested by the trends in the adjusted prevalence rates (Fig. 6).

The surveillance activities carried out in the EU, even with limitations and heterogeneity, are an unique resource in the international scene to monitor the spread of scrapie and the potential effectiveness of control programs. If the comparison between countries can be tricky, the examination of within-country trends, however, can be very interesting: the countries that have pursued with greater conviction the strategy based on breeding plans (e.g. UK, Netherlands, France) show the more encouraging trends. In our country, the monitoring has been able to document the importance and spread of the disease and to deal with the consequences. However, despite the effort put in the selection plans in sheep, it does not emerge a clear, positive impact on the incidence or prevalence of the disease yet. To better understand what is happening, it will probably be important to focus on **individual regional data**: it would allow to make the results of monitoring comparable and to take into account the characteristics and effectiveness of each regional selection plan.

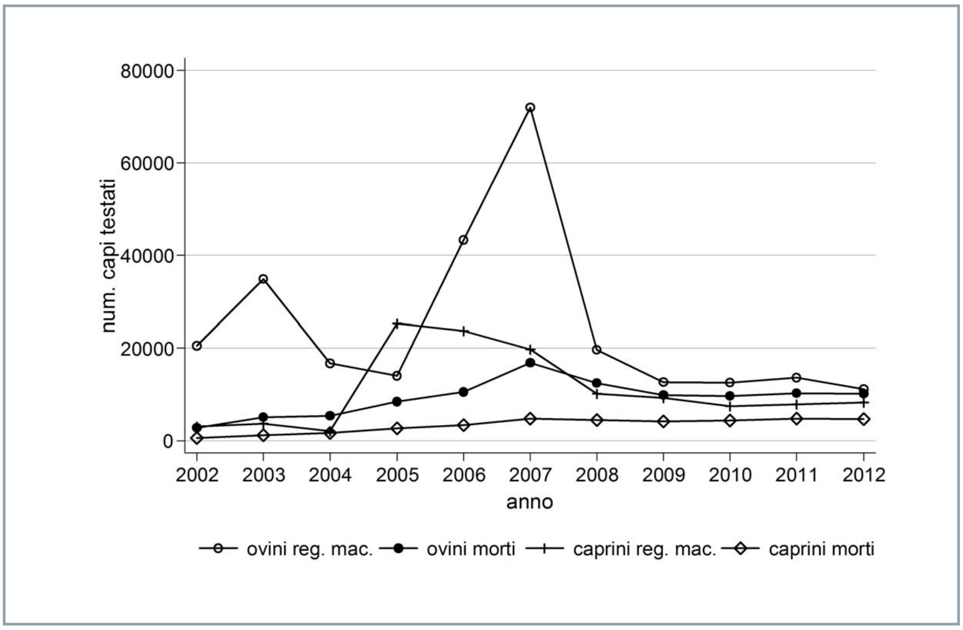

Figure 4.
Trend of the number of animals tested per species and surveillance stream: data from active surveillance in the period 2002-2012 (HS healthy slaughtered, FS fallen stock)

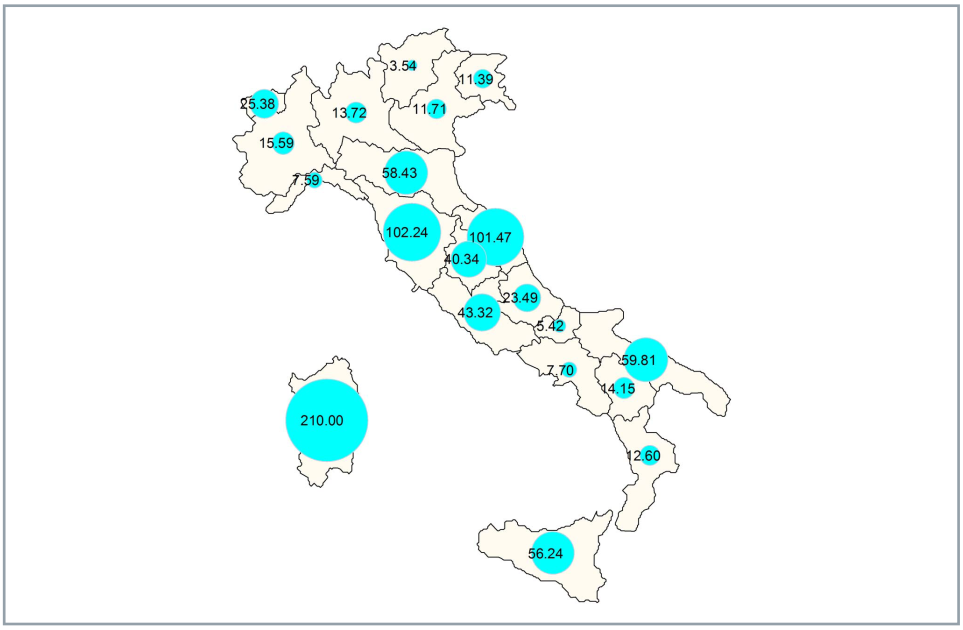

Figure 5.
Geographical distribution of the incidence in Italy (number of new outbreaks per 10 thousand at risk herds/flocks) on a regional basis for the period 1995-2012. Data refer to sheep and goats combined

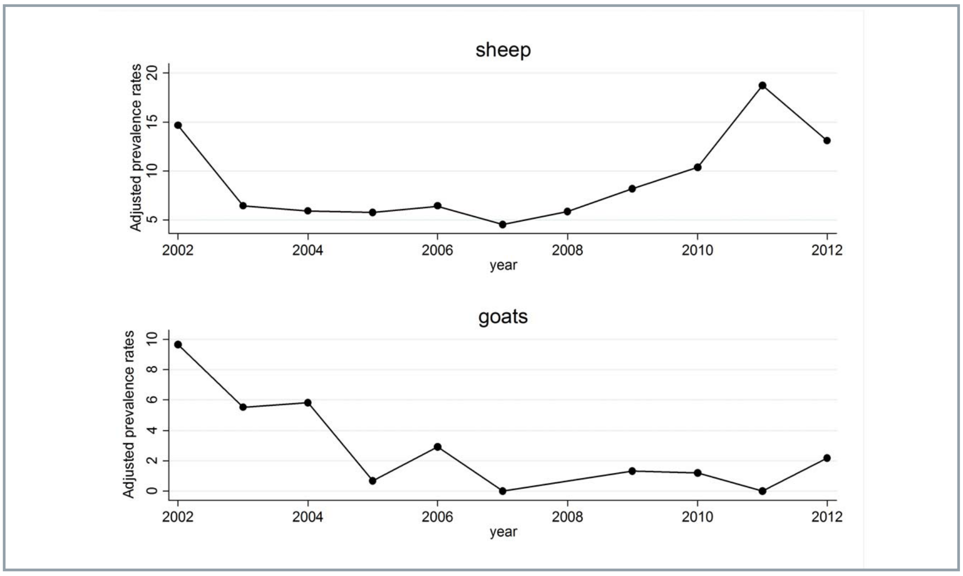

Figure 6.
Annual trends in prevalence (cases per 10,000 tests) directly standardized on age and surveillance stream between 2002 and 2012

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Take action in public health-an example: dioxins in Puglia

This will not be a chance to frame dioxins and dioxin-like compounds from a chemical point of view as well described in the previous number 5 of this epidemiological veterinarian newsletter. However, this space will be dedicated to the issue deepening by bringing the reader's attention on the activities undertaken by the veterinary services jointly with the National Reference Laboratory (NRL) for Dioxins and PCBs in the management of the emergency referred to the "Ilva" in the city of Taranto, Apulia region.
The national interest site of Taranto is the site of an industrial complex made up of one of the largest steel plants in Europe with petrochemical establishments, cement manufacturers, shipbuildings including a large industrial port, a military arsenal and illegal waste sites from various sources (Iavarone I. et al., 2012).
Channeled and not channeled emissions of pollutants steel plant in Taranto have been and are still high. Controls and monitoring systems realized by the regional structure, ARPA Puglia, have highlighted several problems over the years with respect to concentrations of PM_{10}[1] (Forastiere F. & Biggeri A., 2012).
Environmental monitoring and measurements of industrial emissions in the area of Taranto showed a framework for widespread environmental pollution with a significant contribution of the industrial city pole, in particular the steel complex on the levels of environmental pollutants of health interest (Comba P. et al., 2012).
In addition, monitoring campaigns put in place by regional veterinary services of Taranto reported a significant food chain contamination from other compounds, such as organo-halogenated, in some farms of the municipality and the province of Taranto (Iavarone I. et al, 2009).

The detection of damaging contaminants in the area of Taranto is a further example besides the already mentioned incidents that have affected our peninsula which: the health emergency between 2002 and 2008 which concerned the discovery of dioxin concentrations exceeding the law limits in the milk of sheep, cattle, buffalo and in feed from Campania Region (Diletti G. et al, 2003) (Diletti G. et al, 2004) (Borrello S. et al., 2008); the burning of a factory used as a storage center and as waste recovery which led to the release of high amounts of toxic substances into the environment and the subsequent contamination of the crop in the province of Terni in 2009 (Ceci R. et al., 2010); and finally PCBs contamination of fish products from Lake Garda in 2011.

Dioxins and some PCBs named dioxin-like PCB (DL-PCBs) for similar toxicological properties are often designed and managed jointly in the context of public health activities. Other PCB, referred to as "non-dioxin-like PCB" (NDL-PCB), are characterized by a different mechanism of toxicity compared to PCDD / F and DL-PCB but they can also cause adverse effects on human health.
Two case-control studies performed in Taranto seem to support the hypothesis of an etiologic role of environmental exposures to carcinogens inhaled on cancer of the respiratory system and a trend in the risk of lung cancer and pleural according to the residence distance from most of the emission sites considered in the study (including the steel and the shipyards) (Vigotti MA et al., 2007) (Marinaccio A. et al., 2011). This is also confirmed by data on workers exposures (Marinaccio A. et al., 2011).

Man can come into contact with dioxins mainly through three sources of exposure: accidental, work-related and environmental. The first concerns contamination due to accidents, the second concerns limited groups (occupationally exposed), as in the case of people working in the manufacturing of certain chemical products or pesticides. The environmental exposure, finally, can affect large sections of the population and can take place mainly through diet by **contaminated food** although there may be other ways of exposure such as dust inhalation or contact.
Data on **human exposure** to PCDD / PCDF and dioxin-like PCBs emphasize the close link with the intake of foods of animal origin (about 95% of the exposure to dioxins occurs through contaminated food and, in particular, animal fats).
Therefore, the carcinogenic prospective and a likely PCBs carcinogenicity (compounds included in the **Stockholm Convention on POPs - Persistent Organic**

1. The term PM10 *(Particulate Matter)* identifies material present in the atmosphere in the form of microscopic particles whose aerodynamic diameter is equal to or less than 10 or also referred to as "dust thin".

Pollutants) causes great concern among consumers.
Because food contamination is directly related to feed contamination, an integrated approach should be developed to reduce the incidence of dioxins and PCBs throughout the entire food chain from raw materials included in feed for animals intended for human diet.
The two opinions adopted by the Scientific Committee on Food (SCF) (SCF, 2000; SCF, 2001) and by the Scientific Committee on Animal Nutrition (SCAN) (SCAN, 2000) provided the scientific basis for the Community measures to limit the presence of these contaminants in food and feed as part of an overall strategy to reduce their presence in the environment and in the food chain. A community strategy for dioxins, furans and PCBs was adopted by the Commission on 24 October 2001, addressing measures to limit or to eliminate their emission into the environment through source-directed measures and addressing the way to actively decrease the presence of dioxins, furans and PCBs in food and feed. The Dioxin Strategy describes an integrated approach to legislation on **food and feed** on the one hand and on the other hand on **environment** to reduce the presence of dioxins, furans and PCBs throughout the food chain.
This integrated approach consists of three pillars:

1. **The establishment of strict but feasible maximum levels** in food and feed taking into account the results obtained in lowering the presence of dioxins in the environment;
2. **The establishment of action levels** to trigger action when levels in food or feed are found clearly above background levels. These action levels have an early warning function;
3. **The establishment of target levels** to be achieved over time so as to bring the exposure of the majority of the European population within the limits recommended by the Scientific Committee on Food.

Some surveys have been carried out in the period 2008-2011 under the National Plan on Animal Nutrition (NPAA) and under the National Residues Plan (NRP). Thereafter, a series of monitoring activities have been carried out between October and December 2012 with *ad hoc* sampling plan in the area of Taranto.

Period 2008-2011

In this period, the regional Veterinary Services (RVS)of the Department of Prevention of Taranto carried out many samples of foodstuffs of animal origin and samples from animals bred near the ILVA establishment searching for PCDD / F and DL-PCBs. From 2002 to 2007 the RVS have done sampling in accordance with the Plans and further sampling for the search of heavy metals in mussels farmed in the waters in front of Taranto.

With the Monitoring Plan 2008-2010 samples of milk, cheese and fodder for livestock were also taken.

All the farms have been checked within 15 km from the industrial area of Taranto and only 50% of the farms have been tested between 15 and 20 Km.

Samples of milk from cows and sheep and goats and organ samples from slaughtered sheep and goats have been collected and were found not comply for the sum PCDD / Fs and DL-PCBs but the highest levels of contamination have been found from sheep and goats milk.

These findings have led to the introduction of limiting measures such as the positive farm seizure, the killing and the destruction of 2.271 sheep and goats.

Following the detection of PCDD/Fs and DL-PCBs values exceeding the limits of the law (referred to the action level) in a fish and in a mussels samples, a monitoring plan has been put in place to monitor mussels both bread in Mar Grande and within two area named first and second sinus in Mar Piccolo (figura 1).

Mussels sampled in the first sinus of Mar Piccolo showed a higher concentration of the two major contaminants and peaks of contamination in summer due to the increased filtering capacity in conjunction with the water temperature increasing as well as the fat component in shellfish in summer.

Figure 1.
Mussel farms confinement in Mar Grande and in Mar Piccolo (distinguished within sinus 1 and 2)

Ad hoc Sampling Plan 2012

Following the results reported in the period 2008-2011 period, a new sampling plan has been prepared during the month of October 2012. Sampling in sheep and goats herds have been performed in the same study area that is in an area of 20 km radius around the ILVA with the aim to evaluate the effectiveness of the safeguards measures and possible changes in PCDD/Fs and DL-PCBs levels in foodstuffs of animal origin compared to the past results. The sampled area was divided into two zone: the first one, the much more internal, represented by a circle of 10 kilometers radius around the steel and the second one represented by an external circular crown which surrounds the first area of radius greater than 20 km **(Figure 2).** The selection of species to be sampled was carried out in relation to the grazed sheep feeding in our area. This type of diet exposes sheep to assume significant amounts of PCDD/Fs and DL-PCBs. Moreover, for the same power supply to pasture, the amount of food taken from the sheep compared to its body weight makes it more sensitive than cattle as a marker of environmental contamination by PCDD/Fs and DL-PCBs. Milk was sampled for simplifying the sampling and for the opportunity to quickly execute draw blood from live animals without waiting the time required to have livestock animals ready for slaughter. In this *ad hoc* sampling plan a total of 86 samples of milk and cheese from sheep and goats and 23 feed samples were collected and subsequently analyzed. Of the total number of tested samples, non compliant results for the sum of PCDD/Fs and DL-PCBs have been found in 5 milk samples; 14 milk samples and one of vegetable matrix were greater in the level of action. For each sample, for measuring dioxins 17 congeners were determined 2,3,7,8-chlorine substituted congeners and for dioxin-like PCBs. The analytical determinations were carried out with confirmatory methods, based on gas chromatography - high resolution mass spectrometry (GC-HRMS); the compliance of the samples has been evaluated applying the maximum levels fixed by the by Regulation (EU) No 1259/2011 for food and Regulation (EU) No 277/2012 for feed.

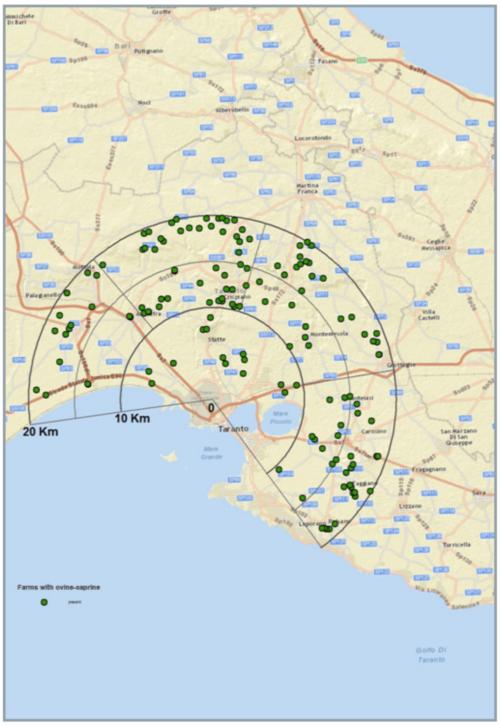

Figure 2.
Study area and its sectioning for the sampling purpose

Public health: emergency management

The incidents of contamination by dioxins, confined to particular local situations that involved Italy in the last decade have highlighted the need or the country to implement a risk management policy in food safety based on traceability, on product identification, identification of risks in the food chain and the implementation of strict and continuous monitoring and evaluation systems on the levels of contamination in feed and food. For the risk management is essential to achieve these objectives in order to identify the sources of contamination in the shortest time and consequently to minimize the risk to the consumer. The goal of whatever health and environmental surveillance as in the case of dioxins, is to provide decision-making tools to develop programs for prevention and control. For this purpose the Ministry of Health, in cooperation with the National Service Centre at the Institute Zooprofilattico Abruzzo and Molise G. Caporale has provided the National Veterinary Food Security Information System (SINVSA).

SINVSA is available on the National Veterinary Information System website reachable at https://www.vetinfo.sanita.it/. It has allowed the harmonized and computerized management both of sampling activities performed by Regional Veterinary Services of Taranto region and the laboratory analytical results processed by the NRL for Dioxins and PCBs.

Specifically, SINVSA has suitable sections designated as:

- *Anagrafiche* (Registries) in which operators data registries are handled
- *Controlli* (Controls) in which monitoring and sampling activities are handled
- *Esiti* (Results) in which carried out-outcomes are managed
- *GIS* (Geographical information System) for the sampling and results spatial visualization
- *Export* for the management of companies certification exporting to third countries.

The availability of farms coordinates and of other sampling sites allowed to display on the map sampling activities carried out (using a cartographic system for displaying the geo-referenced data) and therefore simplified the adoption of the health measures to protect the public health.

SINVSA has been created with the aim to collect and present health data and also data not related to health useful to the national system of animal health and food security government with particular attention to defining health risks along the entire production chain, from feed production up to the marketing of foodstuffs for human consumption (from farm to fork). As well as managing data of the national plans recording all most significant information in order to periodically report the European Community, the system has been proved to be an essential computerized support to manage a specific localized health problem, as in the case of health emergency "Ilva" of Taranto since it allowed the manage of some activities as the taken samples handling, to check regional Veterinary Services activities, to produce reports for Health Authorities and to process data in order to undertake health measures aimed at the protection of Public Health.

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HAND ON DATA

15th may 2013

Number of outbreaks reported to SIMAN in the first quarter 2013

Disease	Januray	February	March	Total
African swine fever	1	3	6	10
American foulbrood of honey bees			2	2
Bluetongue	11	2		13
Bovine leucosis	1	1	4	6
Bovine tuberculosis	42	33	41	116
Brucellosis of cattle, buffalo, sheep, goats and pigs	62	51	63	176
Caprine arthritis/encephalitis	2			2
Contagious agalactia	6		4	10
Contagious bovine mastitis		1		1
Equine infectious anaemia	1		2	3
Erysipelas	2	1		3
Leptospirosis	1	1	1	3
Listeriosis	1			1
Low patogenicity Avian influenza in poultry		1		1
Non-typhoidal avian salmonellosis		1		1
Rabbit haemorrhagic disease	2		1	3
Salmonellosis (S. abortusovis)	10	2		12
Schmallengberg disease	3			3
Scrapie		6	2	8
Swine vescicular disease			1	1

Number of outbreaks reported by Regions to SIMAN in the first quarter 2013

Region	Disease name	January	February	March	Total
ABRUZZO	Brucellosi dei bovini, dei bufalini, degli ovini, dei caprini e dei suini			1	1
BASILICATA	Brucellosi dei bovini, dei bufalini, degli ovini, dei caprini e dei suini	6		4	10
	Scrapie		1		1
CALABRIA	Brucellosi dei bovini, dei bufalini, degli ovini, dei caprini e dei suini	5	7	8	20
	Malattia Vescicolare			1	1
	Tubercolosi Bovina	3	2	1	6
CAMPANIA	Anemia infettiva degli equini			1	1
	Brucellosi dei bovini, dei bufalini, degli ovini, dei caprini e dei suini	9	4	11	24
	Leucosi bovina enzootica			1	1
	Listeriosi	1			1
	Tubercolosi Bovina	3		4	7
EMILIA ROMAGNA	Influenza Aviaria -Bassa patogenicità nel pollame		1		1
	Mal rossino	1			1
	Peste americana			1	1
	Salmonellosi aviare non tifoidee		1		1
	Scrapie		1		1
LAZIO	Anemia infettiva degli equini	1		1	2
	Leucosi bovina enzootica		1		1
	Salmonellosi ovina	2			2
	Tubercolosi Bovina	1		1	2
LOMBARDIA	Tubercolosi Bovina			1	1
MARCHE	Scrapie			1	1
MOLISE	Tubercolosi Bovina			1	1
PIEMONTE	Malattia virale emorragica del coniglio	1		1	2
	Schmallenberg	1			1
	Tubercolosi Bovina	1			1
SARDEGNA	Agalassia contagiosa degli ovini e dei caprini	5		4	9
	Artrite / encefalite delle capre (CAE)	2			2
	Febbre Catarrale degli ovini (Bluetongue)	11	2		13
	Leptospirosi animali	1	1	1	3
	Malattia virale emorragica del coniglio	1			1
	Peste Suina Africana	1	3	6	10
	Salmonellosi ovina	8	2		10
	Schmallenberg	2			2
	Scrapie		4	1	5
	Tubercolosi Bovina		1		1
SICILIA	Brucellosi dei bovini, dei bufalini, degli ovini, dei caprini e dei suini	42	40	39	121
	Leucosi bovina enzootica			3	3
	Tubercolosi Bovina	34	30	33	97
TRENTO	Agalassia contagiosa degli ovini e dei caprini	1			1
	Mastite catarrale contagiosa dei bovini		1		1
	Peste americana			1	1
UMBRIA	Leucosi bovina enzootica	1			1
	Mal rossino	1	1		2

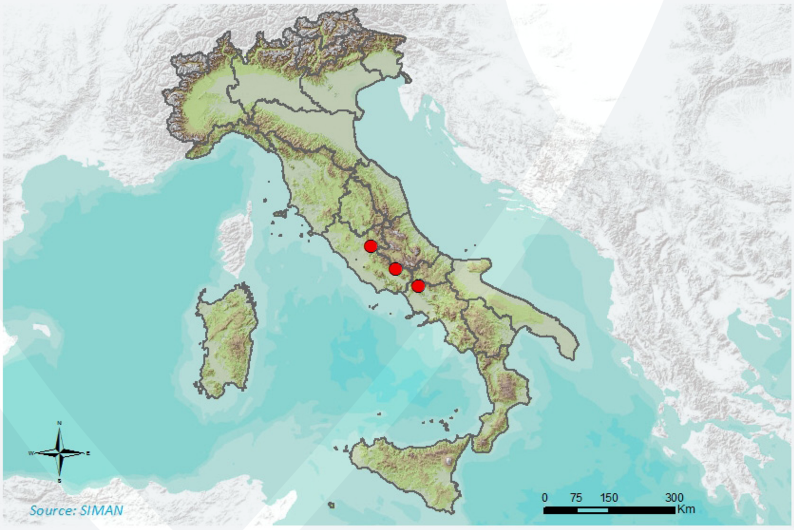
Animals involved in outbreaks reported to SIMAN in the first quarter 2013

Disease name	Animals involved	No. of animal in the holding	No. of diseased animals	No. of died animals	No. of culled animals	No. of destroyed animas
African swine fever	Suidae	15	12	7	6	10
American foulbrood of honey bees	Bees	16	11	5	5	10
Bluetongue	Ruminants	1829	30	0	0	0
Bovine leucosis	Ruminants	232	21	0	18	0
Bovine tuberculosis	Ruminants	6333	692	1	441	11
Brucellosis of cattle, buffalo, sheep, goats and pigs	Ruminants	20722	2046	3	1227	4
Caprine arthritis/encephalitis	Ruminants	262	13	0	0	0
Contagious agalactia	Ruminants	3241	402	3	1	0
Contagious bovine mastitis	Ruminants	14	1	0	0	0
Equine infectious anaemia	Equidae	25	4	0	1	0
Erysipelas	Suidae	9056	4	3	1	3
Leptospirosis	Domestic carnviores	3	1	1	0	1
	Suidae	65	2	2	0	2
Listeriosis	Ruminants	83	1	1	0	0
Low patogenicity Avian influenza in poultry	Birds	222	0	1	182	183
	Poultry	118	4	0	118	118
Non-typhoidal avian salmonellosis	Poultry	71000	14500	0	0	0
Rabbit haemorrhagic disease	Rodents	31501	307	307	0	56
Salmonellosis (*S. abortusovis*)	Ruminants	4401	116	0	0	0
Schmallengberg disease	Ruminants	292	10	0	0	0
Scrapie	Ruminants	2216	11	19	207	4
Swine vescicular disease	Suidae	4	4	0	4	4

A LOOK AT THE MAPS

The geographical distribution of the main animal diseases

Equine infectious anaemia



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Geographical distribution of the outbreaks

Bluetongue

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Geographical distribution of the outbreaks

Swine vescicular disease

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Geographical distribution of the outbreaks

Avian influenza, low patogenicity

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Geographical distribution of the outbreaks

African swine fever

--
Geographical distribution of the outbreaks

Schmallemberg

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Geographical distribution of the outbreaks

AROUND US

The main events of epidemiological interest in the last months in the European Union and in the neighbour countries

Atlas of health and climate: a new scientific tool for the protection of public health

The Atlas of health and climate is a document that **combines meteorological and public health data**, and it is a product of collaboration between the World Health Organization (WHO) and the World Meteorological Organization (WMO). It examines the risk of emerging diseases in relation to climate changes and concrete examples on how the use of time and climate information is able to protect public health are given.

Droughts, floods, hurricanes and cyclones affect the health of millions of people every year and can cause outbreaks of cholera, malaria, dengue fever and meningitis. In the Atlas there is a map (**Figure 1**) which shows the relationship between rainfall levels, access to drinking water and sanitation and the incidence of cholera in 2010. The incidence of cholera is higher in some parts of Africa and Asia, where poverty and the lack of safe drinking water prevails and improving sanitation process is very slow. **The use of climate data can help to predict the onset, intensity and duration of outbreaks**. The map also collects climate data in case of flooding and therefore allows the identification of areas most at risk of cholera and the programming of actions by government bodies. The maps are a very useful tool for the prevention of risk and allow the creation of an **early warning system** that can effectively manage catastrophic events. We can take the example of Bangladesh where the number of deaths from tornadoes has decreased from 500,000 in 1970 to 140,000 in 1991, and to 3000 in 2007, a demonstration of how collaboration between meteorological services, health and emergency can save lives.

In the case of meningitis, instead, there is a seasonal pattern, as is clear from studies in Sub-Saharan Africa: the period with the highest number of cases is that in which there is an increase of concentrations of dust (storms sand) and a reduction in the levels of humidity. Under these conditions, dry air, warm and full of dust irritates the respiratory mucosa, thus facilitating the invasion of the bacteria responsible for the disease, such as *Neisseria meningitidis*. The main way to reduce the spread of this disease is vaccination.

Dengue fever is another disease linked to particular climatic conditions. Since it is transmitted by mosquitoes of the genus *Aedes*, its spread is related to the presence of this vector that lives where the conditions are ideal for its survival, such as in tropical and subtropical countries. In these areas the mosquito breeding is favoured both in periods of heavy rains and floods, both in periods of drought, when people keep at home large amounts of water. High temperature and high population density favor the further spread of the disease.

In the Atlas the importance of weather is also considered in case of heat waves characterized by high summer temperatures often accompanied by high levels of relative humidity. It has been estimated that for every degree Celsius above the threshold level, deaths from cardiovascular disease and respiratory diseases related to excessive heat increase of 2-5%. Those at greatest risk include the elderly, the chronically ill, people who work in open spaces and children. Heat waves cause problems, especially in large cities, which in summer are emptied at the expense of people, mostly elderly, for whom the solitude, thin family networks or social support, may represent a risk factor. It has also been estimated that the number of people over 65 years of age who live in the city, will nearly triple by 2050. Another chapter of the Atlas is dedicated to **air pollution**. In 2008 there were 1.3 million premature deaths in urban environments due to high levels of air pollution in the form of fine particles (PM_{10}). In developing countries there are up to 2 million deaths a year, mostly women and children, caused by the use of solid fuels in the kitchen and the consequent pollution of the air they breathe at home. The use of cleaner fuels for household could save many lives. In general, to improve the current situation related to air pollution should be monitored air quality and invest in renewable energy making them more effective.

Prevention, therefore, has a crucial role to deal with all situations related to climate change. The **collaboration between meteorological services and health** allows the creation of a rapid alert system that allows to save many lives.

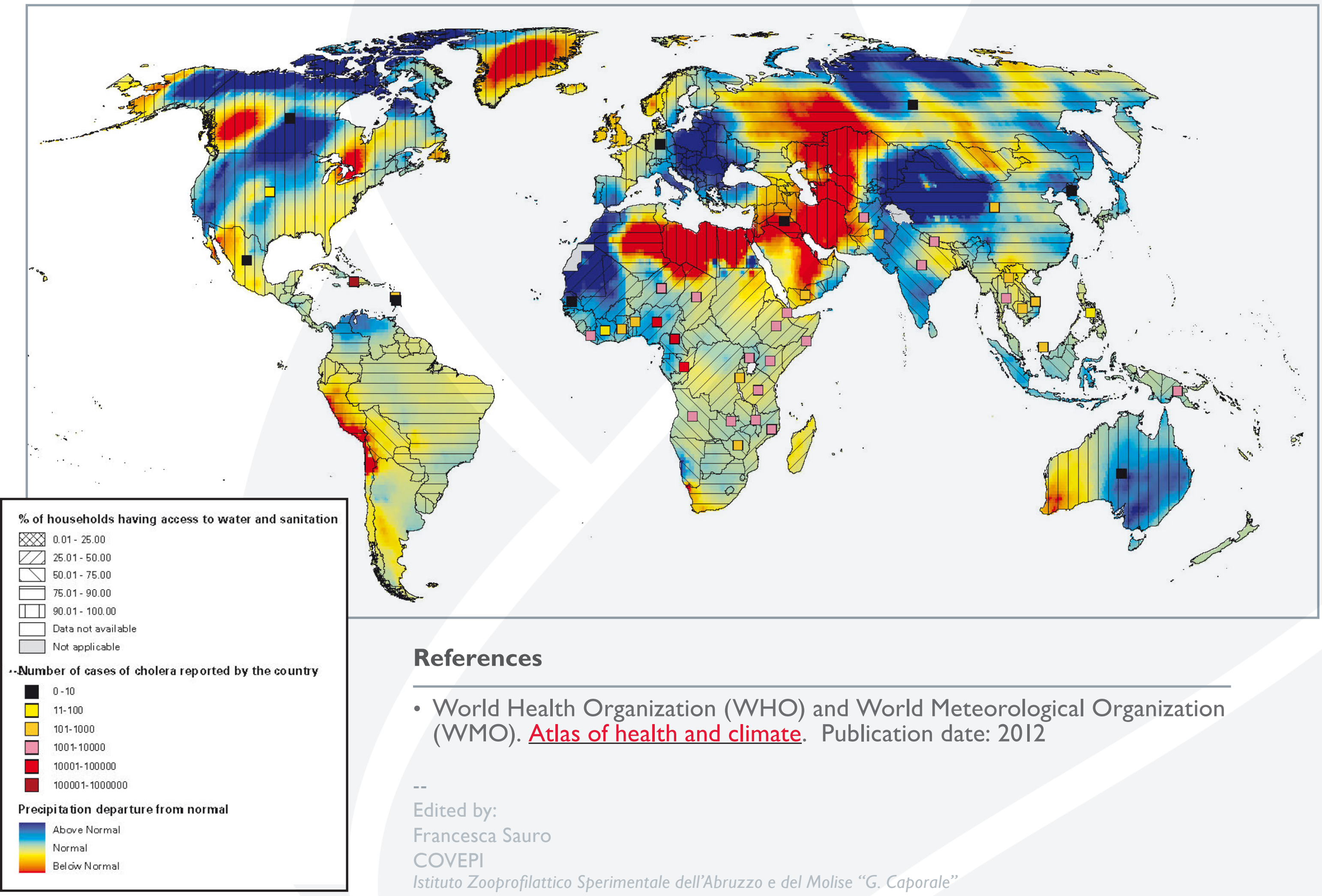

Figure 1.
Relationship between rainfall levels, access to drinking water and sanitation and the incidence of cholera in 2010
Fonte: Atlas of health and climate

References

- World Health Organization (WHO) and World Meteorological Organization (WMO). Atlas of health and climate. Publication date: 2012

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Animal Welfare during slaughtering

Introduction

A healthy lifestyle requires a healthy diet, both in terms of quality and quantity. Meat is an important constituent of our diet in the world and in Europe, as it is a primary source for satisfying the protein and energy demand. Meat, which is the result of a gradual degradation process of the muscle, is a versatile culinary product and has become a primary element of cooking and of European culture (EC, 2004). Estimates and analysis report that the production of meat in Europe after ascended decreases, will reach approximately 45 million tons in 2022, roughly the same level as in 2011 (EC, 2012a). Such data attesting the consumption of meat is directly influenced by the very category of consumers who are affected by the "meat paradox" phenomenon, namely a lot of people like eating meat but a few like to mistreat or kill sentient creatures (Loughnan *et al.,* 2010). In order to reduce this conflict, one should deny that animals suffer and have rights (Bratanova *et al.,* 2011), or else one should consider the application of rules not merely as a bureaucratic act, but rather as a means aimed at the protection of animals during slaughter.

The market and the European and Italian legislation

Over the years, slaughter has confirmed its major role not only as both an epidemiological observatory assisting veterinary public health (Guarda, 1990) and a health investigation site (EFSA and ECDC, 2013), but also for the assessment and monitoring of farm animals' welfare. It is precisely by detecting animals' health conditions as well as animal-based measures, during the *pre*-and *post-mortem* examination (EFSA, 2012), that we are able to trace and get back to the management type implemented on the farm, thus allowing to estimate the compliance degree with legislation, codes of conduct, or in accordance with the quality system. In past years, the community was oriented to evaluating and ensuring Animal Welfare standards by especially defining structural and management skills. Nowadays, this approach has proved to be not fully adequate to ensure the effective safeguarding of Animal Welfare. In order to improve it, it is being taken into account the introduction of more "focused" welfare indicators, through the definition of "animal-based measures", which, if detected directly on the animals, define their health state and welfare. At the moment, animal-based welfare indicators have been introduced in Regulation (EC) No. 1/2005 concerning animals' welfare during transport, in Directive 2007/43/EC laying down minimum standards for the protection of chickens bred for meat production, and in Regulation (EC) No. 1099/2009 on the protection of animals during slaughter (EC, 2012b).

The role of the slaughterhouse in promoting farm animals' welfare.

Con il passare degli anni, il macello conferma il suo importante ruolo non solo in qualità di osservatorio epidemiologico di ausilio alla sanità pubblica veterinaria (Guarda, 1990) e come sito di investigazione sanitaria (EFSA e ECDC, 2013), ma anche per la valutazione e il monitoraggio del benessere animale in allevamento. Proprio attraverso le rilevazione dello stato di salute e delle misure basate sull'animale, durante la visita pre- e post-mortem (EFSA, 2012) è possibile tracciare e risalire al tipo di gestione applicata in allevamento, consentendo di stimare il livello di rispetto della normativa, dei codici di condotta o secondo sistema qualità. In passato, l'orientamento comunitario era di valutare e garantire il benessere animale soprattutto definendo standard strutturali e manageriali. Oggi questo approccio si è dimostrato essere non del tutto adeguato a garantire un'efficace tutela del benessere animale. Al fine di migliorarlo, si sta valutando l'introduzione di indicatori più "diretti" di benessere, tramite la definizione di "misure basate sugli animali", che rilevate direttamente sull'animale vanno a definirne lo stato di salute e benessere. Al momento, gli indicatori di benessere basati sull'animale sono stati introdotti nel Regolamento (CE) N. 1/2005, relativo al benessere degli animali durante il trasporto, nella Direttiva 2007/43/CE, che stabilisce le norme minime per la protezione dei polli allevati per la produzione di carne, e nel Regolamento (CE) N. 1099/2009 relativo alla protezione degli animali durante l'abbattimento (CE, 2012b).

Necessary steps for the protection of Animal Welfare

All operations, prior to and following slaughter itself, require expertise and professionalism. The activities related to the living animal shall be carried out in a precise manner and within a specific timeframe for the respect of Animal Welfare.

Unloading animals from the vehicle:

While in the past all animals to be slaughtered reached the abattoir on foot, nowadays, thanks to globalization and the market growth, it is no longer so (Gregory, 1998). Operators must handle the animals favoring their ethological characteristics according to the species, so as to avoid further exciting them after a transport. Facilities (ramps, unloading area, etc.) must be adapted in order to prevent animals from slipping, falling, escaping or get injured as well as to avoid shaded areas.

Housing while awaiting slaughter:

Animals unloaded from the vehicle may be either sent for slaughter directly or housed in appropriate areas if not slaughtered within 12 hours. The housing in such areas, which are suitable in size and equipment, allows animals to recover from the stress following a transport. The ideal stay time for each species is still under study, however we already know the effects of the duration (shorter or longer) on the manifestation of the PSE and DFD alteration in the meat (Adzitey, 2013; Zhenet *al*., 2011). Keeping comfortable conditions at this stage is very important. The use, therefore, of both appropriate equipment (such as temperature monitoring systems) and good management practices (e.g. to avoid overcrowding episodes in the pens) is essential. The equipment management (especially of cooling or heating systems for live animals), represents a 7% average of the total cost for the production of a carcass (EC, 2007).

Restraining prior to stunning::

Restraining, namely the submission of the animal to stunning, may be done either manually or mechanically. The manner by which the animal is restrained helps determining the right position of the stunning equipment (Gregory, 1998) and ensures the operator's safety. The equipment used for restraining must be appropriate to the weight and size of the animal. Furthermore, an animal must not be restrained if you are not able to guarantee success of the stunning operations. Attachment II of Regulation (EC) No. 1099/2009 shows the structural and maintenance requirements appropriate to the housing and restraining areas.

Stunning:

Stunning is practiced in order to induce the animal to a state of temporary unconsciousness and numbness to pain and perceptions. Such conditions shall be kept until severing its major blood vessels, which bring the animal to death by hypoxia. However, some of these methods are not limited to temporary stunning, since they are capable of inducing even death. Stunning techniques are classified as invasive and non-invasive, or as mechanical, electrical and chemical methods, depending on the nature of the means applied. The penetrating captive bolt is an invasive and mechanical method, mainly used for cattle and horses. The gun, loaded with a bullet that calibrates its power, shoots a piston that alters the integrity of the skull bones. According to research conducted in Europe, it seems that the state of unconsciousness may be longer than 10 minutes in adult cattle and calves, and that from 4% to 6,6% of cases a second shot is required for an effective stunning (EC, 2007). This may be due to insufficient immobilisation of the animal's head as well as to wrong positioning and poor maintenance of the gun. Electronarcosis is an electrical non-invasive method used in cattle, pigs, sheep and poultry. Electrical current reaches the animal through the application of electrodes that are placed according to the "head-only" or "head-body" method. Through the "head-body" method it is possible to reach immediate unconsciousness or death. The "head-only" technique is usually used for cattle and sheep Both techniques are used for adult pigs. Unconsciousness is of short duration, 12 seconds for calves and 23 seconds for cattle. As to pigs, with the "head-only" method, the state of unconsciousness differs depending on whether the electrodes are applied either manually or mechanically (EC, 2007). The stunning of poultry occurs by means of electrified water baths; in this case, the current flows through the whole body of the animal. A stunning whose outcome was ineffective may be due to insufficient application of electric current or, in the case of mechanical equipment, to a lack of calibration according to the animals' size. Gas stunning is a chemical non-invasive method, mainly used for pigs and poultry. At the moment, the

"dip-lift" and "paternoster" systems are the most commonly used equipment. The "dip-lift" system exposes the animals directly to the highest gas concentrations, while by the "paternoster" system animals reach the maximum concentration after having undergone intermediate stops at different levels of CO_2. An effective stunning depends on both the concentration of gas used and the time of exposure.
Attachment I of Regulation (EC) No. 1099/2009 provides a list of stunning methods with their description, conditions of use, parameters and specific requirements for some methods.

Hanging and stun to stick interval:

Once stunning is concluded, **the animals**, except when they are already hanging, are either hanged up by their rear limbs or laid on a plane. The reversibility of the stunning requires for the jugulation **to** occur in the shortest time possible, preferably within 15 seconds. The severing of the major blood vessels in the neck or chest, or both, is made according to the species characteristics, **in order to** bring the animal to death in the shortest possible time.

Control procedures and the person responsible for animal welfare

The substantial changes introduced by the Lawmaker in favor of Animal Welfare are the standard operating procedures related to stunning, the regular monitoring of the animal's stunning state and the identification of a person responsible for matters relating to Animal Welfare. The activity planning (both ordinary and maintenance activities), the description of the *modus operandi* and the measures to be taken in case of ineffective stunning are needed to manage, where possible, any situation that might compromise the welfare of the animals **sent for** slaughter. The identification of a manager creates a reference point for the slaughterhouse personnel and the operator in the sector. In the event that the **person** responsible for Animal Welfare and the operator in the sector are **two** different people**, the latter** still remains the only truly responsible. The person responsible for Animal Welfare has the power to monitor and define all the necessary actions to be implemented for the observance of the regulations **as well as of health** and Animal Welfare. **He/she also has** to make sure that staff are trained and skilled. The *Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale"* is the coordinator and author of the e-learning course "**Animal Welfare at slaughter and killing for disease control"**. This activity is part of the "**Better** Training for SaferFood (**BTSF**)**" promoted by** the Executive Agency for Health & Consumers (EAHC) for the Directorate General SANCO of the European Commission, with the purpose of training Member States' Official Veterinarians on EU standards, in order to achieve a uniform implementation of rules within the EU.

Conclusions

The implementation of the new Regulation, thanks to the involvement and responsibility of different figures (official veterinarians, business operators and animal welfare officers), will allow to reduce the suffering to the animals and to improve the quality of the productions, making the consumers more likely to accept the slaughtering of animals as a mean of guaranteeing food production.

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Complexity of food chain nowadays

The European Union (EU) considers the food safety a top priority of its political agenda. Today food safety is become an aspect permeating all various areas of Community competence, including the common agricultural politic and its pillar of rural development, the environment, public health, consumer protection and the completion of the internal market.
The White Paper on Food Safety and Hygiene Package Regulations are important steps in the transformation of European legislation toward more modern food safety approaches. Together with new regulatory rules, the EU has based its food safety policy on an approach of product's path "from farm to fork" as well as the full food "traceability" - namely the possibility through integrated systems to know and verify the history and all the steps of the food through the entire production process - as a pre-requisite for food produced within its territory. The traceability of food is certainly one of the major challenges posed by the EU legislation. It is fundamental not only to allow the clear identification of responsibilities of the different actors involved in the production chain but also to provide the system with an operational tool able to ensure a rapid response to consumer protection, in case of identified risks and food crises.
This framework draws, therefore, a **comprehensive and integrated approach**. According to this approach, the food safety begins at the level of primary production with proper animals feeding and the protection of their health and well-being. Then, the salubrity of food must be assured by the active empowerment of food business operators involved in the process and called to ensure and document the effectiveness of control measures put in place. Finally, controls of food safety authorities, the application of animal health control measures complete the system of guarantees put in place to reduce the risks for the consumers.

Thanks to this approach becomes possible, on the basis of precise documentation and procedures, to trace back the origin and the ingredients of a food, ensuring its "traceability" and description of its production process, which is a mandatory requirement throughout the EU. It should not be forgotten, for example, that only a complex operation of 'tracing-back' was able to provide conclusive evidences that fenugreek seeds were the origin of one of the largest outbreaks of infection of *Escherichia coli* verotoxigenic (VTEC).
In 2011 the **crisis of sprouts** – the contamination by VTEC O104: H4 of sprouts produced by a single large batch of fenugreek seeds imported from Egypt and sold in several European countries - caused 53 deaths in Germany and one in France, and 3482 infections in Europe and North America, so that the term "sproutbreak" was coined. In this case the contamination regards **raw materials**, for which **traceability is often complex**: batches of seeds can be sent to different countries, and can be used to prepare mixtures of sprouts and various products that at each step change code, making sometimes very difficult to trace the primary origin. On the complexity of this story the European Food Safety Authority (EFSA) published a technical report with an overview of the food chain, risk factors, procedures, the most critical points, and formulating proposals to prevent the initial contamination during seeds production, storage and distribution.

In the month of February 2013 some food items were confiscated because of **traces of horse meat not declared on the label**. Among the products involved, several types of stuffed pasta, like lasagna, tortellini and ravioli and sauces ready to eat. The EU recommended the Member States to draw up proper control plans for monitoring the preparations and products made by beef in order to verify the possible presence of equine DNA.
More recent is the news of the requisition and destruction by the Chinese authorities of almost two tons of imported **chocolate cakes**, containing coliform bacteria in excessive amounts. The same products were confiscated in Italy and in other European countries.

These episodes are just some of the events that have involved foods intended for human consumption, bringing into question the healthiness and safety of these products. In the case of horse meat not declared on the label, it is clearly not a health concern, but rather a possible fraud able to undermine the confidence of the consumer in the overall effectiveness of the controls performed in EU along the food chain and in the resulting sanitary certifications.

The recent events and their economic, social and political effect have clearly shown the importance of a **prompt traceability** of the origin of each food ingredient. Since the early 60s, the global transport of food has increased exponentially, faster than production itself, giving rise to real "food flows" between countries. The food chain is composed, in fact, not only by the food's path from farm to fork, but also by a complex network of trade of raw materials and products between one country and another.

Some authors have recently analyzed the complexity of the international agro-food trade network and its impact on food safety through the use of techniques of **Social Network Analysis (SNA)**, a science developed over the last century in the context of sociological and anthropological research, already reported in the issue no. 6 of Benv.

The flow of food among countries is represented by an **international agro-food trade network (IFTN)**. Through the SNA, the IFTN was analyzed in its structure and dynamism in the course of 10 years. According to SNA approach, a network is composed by "nodes" and "edges". The **nodes** can be identified by the countries trading food, while the **edges** are the flow of food trade between countries. The magnitude of a flow is represented by the total value in dollars of the annual agro-food trade from one country to another. In IFTN, the **size** of each node is proportional to the total value of import-export of the country, while the **thickness** of each edge between one node and another varies proportionally to the value in logarithms of the flow of foods that represents. The overall structure of the network plays an important role in the paths through which food and raw materials are propagated through the network itself and can be described using some "**centrality measures**". In particular, the color assigned to nodes and edges represents the value of "**betweeness**", which measures the number of times a node is located on the shortest path that connects two other nodes. In the IFTN the betweeness expresses how central is the position of a node or an edge in the network, i.e. nodes or edges with high centrality are those with higher traffic exchanges in the network. The nodes with the highest values of centrality assume, therefore, a crucial role in the IFTN, because foods or raw materials can be exchanged through it at various points in the network, and trace its origin is even more difficult because of the high number of connections in the network through these nodes. The nodes with the highest values of centrality are shown in **Figure 1**: the United States and France are the countries with the highest value of betweeness, followed by Germany, the Netherlands and Great Britain. During a food-borne outbreak the main objective is to identify the source of contamination and any delay can have serious health, economic and social consequences on the population. The SNA highlights how the effects of **globalization** make complex the trade network of food and raw materials among countries.

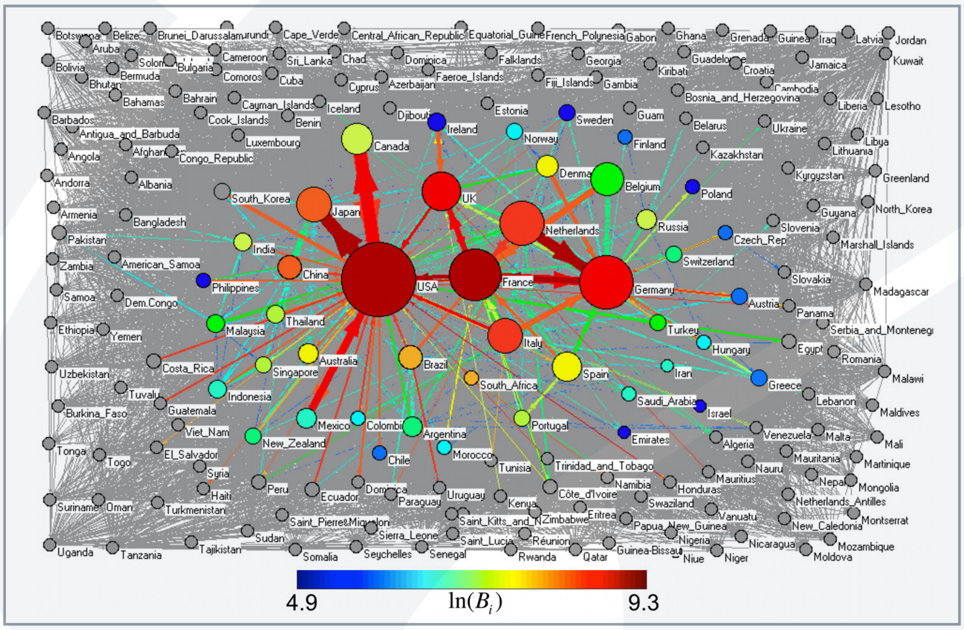

Figure 1.
International agro-food trade network (IFTN) in 1998. (*Ercsey-Ravasz et al., 2012*)

The term "food security" implies not only the concept of the "healthiness" of a food from the chemical, physical or microbiological point of view: in some underdeveloped countries "food security" means the "availability" of a food, i.e. the possibility of food **supply** for the population. In this context, the severity and global nature of the causes

of food insecurity have led the international community to recognize the importance of establishing a global partnership policy to deal with these issues, and therefore, in 1974, inside the Food Agriculture Organization (FAO), was set up the **Committee on World Food Security - CFS**. The CFS is an international platform for the coordination of issues related to food security, entrusted with the monitoring and evaluation of the food security situation internationally.
If until now the full traceability of foods was considered an indispensable prerequisite, prerogative of the health authorities, to ensure the full implementation of the food security policy by the EU, such crises have revealed an increasingly urgent demand by the consumer, to make transparent the entire path of the food and its ingredients until his/her plate. The growing demand for foods with a short chain and **'kilometer zero'**, including for example also the raw milk, that lighted up a debate in Italy in recent years, arise from cultural reasons and sensitivity to issues of environmental protection, and expresses clearly the need for the consumer to find a stand-alone mode to take shelter from the potential risks through 'aware' choices of consumption, even in the food context. In such a scenario, the theme of the **individual's perception of risk** in food safety, could emerge as a complicating factor in the complex of issues related to risk assessment in food safety, sustainability of production and the 'food-security'.
We end this excursus on food safety with a quote from CFS which states that " Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".
To you all inspirations and reflections.

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