A history of the traceability of animals and animal products

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Summary
The author presents a review of the history of traceability as applied to live animals and animal products from antiquity to the 19th Century. The evidence shows that livestock farmers, owners, and those in charge of animal production and health were concerned with traceability from a very early stage. With regard to live animals, individual identification by means of body markings has been practised for over 3,800 years (Code of Hammurabi). Branding with a red-hot iron, with or without a written record of animal characteristics, was employed in most ancient civilisations. This branding technique was principally used on valuable animals, in particular horses, in which case a written record was kept. Individual indelible branding was used on other species over the following centuries, for example, on swans belonging to the Kings of England as early as the 13th Century. Branding for disease control purposes commenced later, prompted by the major epizootics (rinderpest, contagious bovine pleuropneumonia, glanders and rabies). Marking of animals formed part of a series of very pragmatic measures, and the penalties in the event of violation were much more severe than is currently the case. Although modern traceability techniques were not available, our ancestors, as early as the 17th Century, practised indelible branding and strict health certification. Animal products were likewise closely monitored, particularly during the epidemics of human plague during the 14th Century. Some animal products could not be traded internationally unless accompanied by a certificate of origin guaranteeing safety. During the major epizootics of the 18th Century, some contaminated products (meat, hides) were cut up, slashed or covered with lime to indicate that the product was unfit for trade or consumption.

Keywords

Introduction
In Historia Anglicana, Thomas of Walsingham related the following event, which occurred in 1275: ‘A rich man of France brought into Northumberland a Spanish ewe as big as a calf of two years, which ewe being rotten, infected so the country that it spread over all the realm. This plague of murrain continued twenty-eight years ere it ended, and was the first rot that ever was in England’.

Fleming, who reproduced this quotation, had some doubts as to the exact meaning of the terms ‘rotten’ and ‘rot’ used by Thomas of Walsingham, but concluded that the ewe had most likely been infected by both mange and sheep pox (6).

Whatever the case may be, this text, to the best of knowledge, is the first document enabling the retracing of the origin of an epizootic in Europe.

Several centuries after this tragedy affected sheep farms in England, another disease reached western Europe, namely: rinderpest. Identification of the animal responsible for introducing the epizootic into Italy was also possible in this case. The animal was an ox from Hungary, whose story was

summed up by Reynal, as follows: Everyone knows the story of Boromeo the ox, as recounted by the famed Lancisi: on 27 August 1711, a herd of infected cattle from Hungary reached Venetian territory; they crossed the village of Sermeola, two leagues from Bidoa. An ox strayed into the Pampagnini estate, belonging to Brother Boromeo. The shepherd took it in, and gave it shelter in the stables. The animal was returned to its owner, but eight days after the ox was sheltered, all the cattle on the farm fell ill and succumbed (15).

From that farm, the disease spread throughout the territory of Venice, and to several other countries of western Europe, where over 200 million head of cattle perished before the end of the century (13).

These two examples demonstrate that, from a very early time, health officials conducted epidemiological surveys, which were evidently successful, to determine the origin of epizootics. Although such surveys could not draw on the scientific investigative techniques currently available (bacteriological, virological, serological and genetic techniques), more direct procedures were often used, such as denunciation or severe punishment (even death in some cases) for ‘withholding information’ (see below).

Some of the methods used in past centuries to identify and monitor animals and animal products will be presented below.

Traceability of animals
Livestock farmers or owners of animals have for a very long time been concerned with identification, in order to find animals in the event of loss or theft, to make economic choices regarding production or sectors of activity, or to enhance the value of livestock.

The three main identification methods used in the past were based on one of the following:
- a descriptive document, attestation or certificate referring to some sign or brand that distinguished the animal. The document was held by the person responsible for the animal, and in some cases registered by a national authority
- a simple mark placed directly on the body of the animal (skin, horns, hooves, paws, beak, etc.)
- a removable exterior mark (collar, ring, etc.) attached to the animal.

Animal identification and registry
The objectives of animal identification and registry were various, including administration, animal husbandry and prophylaxis.

Identification of valuable animals or animals belonging to official bodies
The first identification documents date from antiquity, as ancient civilisations attached much value to domestic animals, and in particular horses.

Thus, Bucephalus, the horse of Alexander the Great (356-323 BC) was probably named after the image of an ox that had been branded onto the breast and croup of the horse. According to Karin Braun, the name of this horse, and of all horses belonging to the Athenian cavalry, were inscribed in lead tablets that accompanied the animals, and also contained records of the colour and the price of the branded animal and the name of the owner (8).

Under the Roman Empire, horses participating in chariot races were branded with the names of the owners and breeders (12).

In the 7th Century, the Chinese also used branding irons (or ear notches), in particular to identify horses used by the postal services, or in the imperial breeding farms; the names of the animals were inscribed in an official registry.

The horses belonging to the knights of the Teutonic Order (Prussia) were also branded in the 14th and 15th Centuries (9).

In 17th-Century Persia, horses belonging to the royal stables were all registered and branded with the image of a tulip. Some were entrusted to knights who were then responsible for the horse until its death. When such a horse died, the knight had to cut off a piece of branded skin, along with the adjoining muscle, and present this as evidence to the King’s equerry. The latter then crossed out the name of the animal on the register, after making the knight swear that the death was not due to lack of care or sacrifice ‘which the equerry verified by immersing the evidence in water for a few hours’ after which the piece of branded skin was destroyed (1, H. Tadjbakhsh, personal communication).

Animal identification for the control of epizootics
In Europe, the extensive epizootics in the 18th Century brought about the requirement to present written documents certifying the origin of animals.

The first such compulsory certificates date back to the early part of the century. Two examples are described below.

On 20 October 1716, Friedrich Wilhelm I, King of Prussia, issued a decree setting forth measures to avoid the spread of rinderpest: all animals imported from abroad or moved within the kingdom had to be branded, on the right horn, with the letters FAW (Friedrich Wilhelm). The animals were also to be accompanied by a dated document specifying the origin of each animal and the name of the owner. If purchased by a butcher, the initials of the butcher had to be branded onto the left horn of the animal, and the animal could not be slaughtered until three days after the sale (in order to verify that no disease was being incubated). Some of these measures had already been
proclaimed in 1711 and 1714. Violators were imprisoned, branded with a red-hot iron, or executed, depending on the seriousness of the offence (19).

On 19 July 1746, the Council of the King of France issued a decree ‘indicating the precautions to be taken against the epidemic disease of livestock’. The decree proscribed, inter alia, that animals infected by rinderpest must have the letter ‘M’ stamped on one horn, and must be immediately slaughtered. All healthy animals moved from their farms of origin required a certificate established by a police officer (countersigned by the parish priest or a law officer). This document stated the town (or parish) of origin of the animals, the status of the town or parish ‘with regard to the disease’, as well as the number and designation of the animals moved. The document was compulsory for entry to fairs and markets, and anyone presenting certificates ‘contrary to the truth’ was subject to a fine of 1,000 pounds, and a punishment involving ‘personal servitude or dishonour’ (15).

Certificates of origin were later made compulsory for various diseases in many countries. Thus, in 1844, Delafond suggested extending the marking system established for rinderpest in 1746, 1784 and 1795 to cover contagious bovine pleuropneumonia. Branding of the letter ‘M’ (malade/diseased), ‘S’ (suspect/suspected), or ‘G’ (guéri/cured) on the shoulder rather than the horn or hoof was suggested, ‘since these marks could be erased by scraping the horn’ (2).

Body markings

Many of the above-mentioned descriptive documents referred to individual marks, placed directly on the body of the animal. The most commonly used marks are described below.

Branding

Branding the skin of an animal with a red-hot iron appears to be an extremely ancient technique; certain bas-reliefs from Egypt depict recumbent bovines, with their four legs tied, branded on the left shoulder (13).

Moreover, as already stated, the horses of the Greek army, those of the Chinese postal services or imperial breeding farms, and those of the Teutonic knights, were also branded. The same method was apparently used by ancient Roman cattle farmers, according to the advice given by Virgil (70-19 BC) in the Georgics (Book III, 157-161): ‘But, yeaning ended, all their tender care is to the calves transferred; at once with marks they brand them, both to designate their race, and which to rear for breeding, or devote as altar-victims, or to cleave the ground and into ridges tear and turn the sod’ (8).

Cattle horns (see above) or the hooves of horses could also be marked with a branding iron.

The skin covering the beaks or feet of swans (Cygnus olor) was also branded to identify the owner. This technique was used in England from the 13th to the 19th Centuries (Fig. 1). Strict regulations were enforced: all marks used, as well as the birds thus branded, had to be officially registered by the ‘Royal Swan-Master’ (14).

Other body marks

In the Code of Hammurabi, proclaimed by the eponymous King of Mesopotamia approximately 3,800 years ago and engraved in a slab of diorite kept at the Louvre in Paris, Article 265 stipulates: ‘If a herdsman, to whose care cattle or sheep have been entrusted, be guilty of fraud and make false returns of the natural increase, or sell them for money, then shall he be convicted and pay the owner ten times the loss’.

According to Finet, the animals entrusted to herdsman in Mesopotamia were identified by marks of different colours, representing the different owners, a practice that has survived to the present day (4).

Colourings (used in different places on the body) or ear rings were also used long ago, in Persia, to identify large and small ruminants (H. Tadjbakhsh, personal communication).
According to the *Corpus Hippiatricum Graecorum* (Book II, p. 281.1), potash (nitre) was sometimes used on horses in ancient Greece and Rome instead of branding irons (8).

In England, swans could be marked (see above) with a fine knife blade, leaving an indelible scar on the skin covering the beak or feet (14).

In France, a decree issued by the Council of the King on 16 July 1784 required the marking of animals suspected of glanders or any other contagious disease such as blackleg, mange, sheep pox, farcy and rabies by stamping, in green wax on the forehead of the animal, the words ‘suspected animal’. The animals thus marked were confined in separate, isolated quarters (15).

However, in 1875 Hurtrel d’Arboval considered the latter method to be ‘radically bad’ and wrote: ‘today, lead marking is to be preferred, especially on cattle. A string is wound around the horns, and the two ends are threaded through a hollow piece of lead, similar to the kind used by customs, which is then flattened using pincers that bear an established sign; the mark is removed when no longer necessary, and yet it cannot be altered without leaving discernible traces’ (11).

**Other marks**

According to Hérodote, in ancient Egypt, animals were inspected before sacrifice by a special order of priests. The priests wound a papyrus bearing a seal around the horns of animals considered suitable for sacrifice; anyone who slaughtered an animal which did not bear this mark was punished by death (3).

Collars were mainly used on dogs. The first Akkadian texts, written in a cuneiform script approximately 5,000 years ago, mentioned the use of collars (h. *ullu*) and leads on pet dogs (5). Collars were useful in that a medallion could be attached containing information relevant to the identification of the animal or the owner.

In the 18th Century, dog identification was made compulsory in many countries of Europe to help control rabies. A collar, indicating the name of the owner and a registration number, was required for dogs in Strasbourg (France) in 1778, in Barcelona (Spain) in 1786 and in Lisbon (Portugal) in 1788 (7, 17).

Rings were used in past centuries by falconers in Persia to identify the hawks and eagles used for hunting (H. Tadjbakhsh, personal communication).

It should be noted that, in certain cases, identification involved not individual animals, but entire herds or farms. This was the case during the epizootics of anthrax in 16th-Century England, when the contaminated farms could be spotted from a distance thanks to a mast displaying the head of a dead cow (16). This also applied to Luxembourg where, in 1769, farms infected by rinderpest were identified by means of a straw torch on top of a pole (18).

In the case of epidemics affecting humans, the identification of individuals or groups was relatively simple. In the Middle Ages, lepers were required to carry and to sound rattles constantly, and plague victims had to carry a coloured cane to warn away anyone approaching (20).

**Traceability of products**

Despite the existence of identification in live animals, health authorities did not become concerned with the identification of animal products until a much later date.

The objectives of product identification fell into two different categories, giving rise to two corresponding types of regulations: firstly to ensure the origin of animal products, and secondly to provide for treatment of the products.

**Measures aimed at ensuring the origin of animal products**

The earliest evidence of concern over the origin of animal products for health reasons apparently dates from the 14th Century, during the major epidemics of human plague, considered by some to be transmissible to and from animals. In a letter to the authorities of the city of Lérida (Spain), dated 24 April 1348, Jehan Jacmé d’Agramont stated that ‘pestilence’ could pollute water and bring about the death of fish, but could also pollute the air and thus affect men, birds, animals, and even plants. Therefore, according to d’Agramont, the municipal authorities should require those selling foodstuffs to present a certificate of origin stating that their wares did not originate in regions or ports where such pestilence occurred (20).

The same types of measures were taken during later epidemics. In 1556, a doctor from Venice, Nicolo Masse, established a list of products he considered capable of transmitting the contagium (wool, skin, feathers, etc.), and whose trade was thus to be forbidden, and a list of non-infectious products (seeds, vegetables, fruits, wines, etc.) to which such restrictions should not apply. Similar provisions were proclaimed and enforced in Naples in 1557. Official inspectors were posted at the city gates, and examined the ‘health bulletins’ accompanying people and goods that entered Naples. These bulletins were to be countersigned by the university officials of the city of origin. The only merchandise these travellers were allowed to carry was aromatic plants or medication, as the importation of all other products was strictly forbidden. Inspectors found guilty of serious negligence or corruption were put to death.
In Persia, in past centuries, certain animal products (meat, fish and cheese, dried or salted), were exported in sealed bags or tin cans. The identity of the shipper was stamped onto these bags or cans (H. Tadjbakhsh, personal communication).

Measures providing for the treatment of animal products

Such measures were aimed either at the removal of certain products from the human or animal food chain, or at the partial or total destruction of such products. The principal products concerned were meat, hides and skins.

Meat

In France, a decree of 18 June 1714 outlawed the sale of meat not bearing a mark which was approved by inspectors at the place of origin of the slaughtered animal and accompanied by a certificate which was signed and authenticated by the competent administrative authority (3).

During the rinderpest epizootics in 18th-Century Europe, the carcasses of animals that had succumbed to the disease were quartered and covered with quicklime (15). While this was not a marking technique per se, the carcasses concerned were easily recognised and were altered to the point where they could not be sold or used.

Hides and skins

In the 18th Century, in order to prevent the trade in or use of skins from animals with contagious diseases, such skins were marked and then buried. Thus, in 1773, Haller recommended, in the event of an animal dying of contagious bovine pleuropneumonia: ‘A cross-shaped incision shall be made in the hide, which shall be buried, along with the animal, in a six-foot deep pit, filled with lime, and surrounded by thorns’ (10). A similar provision appears in a Decree of the Council of the King of France dated 30 January 1775, which states that the hides of animals that died of rinderpest ‘shall be cut in such a way that no further use may be made of them’ (15).

Conclusion

This brief historical overview has demonstrated that livestock farmers, owners, and those responsible for animal production and health were, from a very early date, concerned with the traceability of live animals and animal products.

The practice of branding live animals, and of creating a written record of the characteristics of the branded animals, clearly dates back over 2,000 years.

Marking for sanitary purposes developed at a later date, during the major epidemics or epizootics, and was accompanied by very pragmatic measures and stiffer penalties for violations than those applied today. Although modern traceability techniques were not available (electronic identification, computer files, genetic markers, etc.), our ancestors, as early as the 17th Century, practised indelible marking and enforced strict health certification measures.

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References


