Animal welfare and the intensive production of bovine meat

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Summary: After a brief review of the legal framework of animal protection applicable to cattle – including Council of Europe and European Union legislation, as well as French law – the main features of husbandry systems used in the intensive husbandry of veal calves and young cattle are analysed.

For veal calves, the standards proposed at the European level do not take into account major differences in the age, weight and quality of veal produced by different Member States.

In the case of red meat, the production of baby beef in intensive units leads to some behavioural anomalies, which could be remedied within economic restrictions compatible with the interests of producers and consumers.


INTRODUCTION

The consumer demand for homogeneous products, whether of red meat or veal, amplified by the needs of wide distribution and a desire to rationalise the work of producers, has led to the creation of production units for veal calves and young cattle comprising dozens or even hundreds of animals.

For cattle, as with other animal species, intensive production imposes three conditions:

- grouping animals into batches
- rearing in confinement
- intensive feeding.

Each of these conditions involves constraints, some of which create problems in terms of the health and well-being of animals at the following stages:

- rearing
- transport
- slaughter.

For some time, the best and most economical results from specialised units have been achieved through attention to hygiene, habitat and feeding, but it is obvious that

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high production and a good state of health are no guarantees of satisfactory well-being for the animals, hence the growing interest of public opinion in action concerning animal welfare problems.

**LEGAL FRAMEWORK OF ANIMAL PROTECTION APPLIED TO CATTLE**

For some years, the Council of Europe and the European Union (EU) (formerly European Community) have acted in parallel to improve animal welfare in rearing, transport and slaughter.

**Council of Europe**

Working from philosophical and ethical principles, the Council of Europe has established an objective of averting all avoidable suffering, and ensuring that animals live under conditions which meet their specific biological needs (4).

The Council has issued three conventions which outline the major features of animal protection in the following areas:

- rearing
- international transport
- slaughter.

A Permanent Committee was formed under the Convention for the Protection of Farm Animals, ratified by France in 1976. This Committee is responsible for issuing recommendations, based on scientific information, which specify the ways in which the Convention may be applied in practice.

The following measures have been taken with regard to cattle:

- a draft recommendation has been issued, regarding animals aged less than six months (calves);
- with regard to animals over six months of age, a recommendation was adopted by the Permanent Committee on 21 October 1988.

**European Union**

EU Member States have been aware for some time of the need to cater for animal protection when drafting EU regulations for the Common Agricultural Policy.

In addition to concern over animal welfare, the EU is also charged with ensuring that Member States observe uniform conditions of rearing, transport and slaughter, in order to avoid commercial distortion (4).

To fulfil these objectives, the EU has adopted **Directives** which define minimum standards for the protection of different species of animals.

For cattle under six months of age (calves), the minimum standards are contained in a Directive of 19 November 1991.

**French legislation**

French regulations for protection of animals are extensive and precise; these concern all animal species in the various spheres of rearing, transport, trade, slaughter, etc.
Protection of animals in France is regulated by the Rural Code, Volume 2, Chapter 5: "De la protection des animaux domestiques et des animaux sauvages apprivoisés ou tenus en captivité" ["Protection of domestic animals and wild animals which have been tamed or are kept in captivity"] (Law 76-629 of 10 July 1976).

The first article of this Law (Art. 276) stipulates that it is prohibited to inflict harmful treatment on domestic animals, or wild animals which have been tamed or are kept in captivity.

Various Government decrees specify the steps to be taken to ensure the protection of animals from harmful treatment or abusive use, and to avoid suffering during manipulations inherent in various husbandry systems, penning, transport and slaughter of animals (Decree 80-79 of 1 October 1980).

Veterinary inspectors and technicians of the Veterinary Services are entitled to seek and confirm infractions within the confines of their geographical territory (Art. 283-1-2-3).

In the case of intensive husbandry of cattle, it is specified (Art. 277) that during transport the animals have to be watered and fed at least every 12 hours. Similarly, the precautions to be taken for transport to the abattoir and for slaughter are strictly regulated by prefectorial decrees (Art. 278).

It is the responsibility of public health veterinarians to ensure the satisfactory state of premises, fairs or markets where animals are kept (Art. 280-281-282). These veterinarians are entitled to enter any place where animals are kept. Similarly, they may inspect by day or by night vehicles designed for the transport of livestock (Art. 283-5).

**INTENSIVE PRODUCTION OF VEAL CALVES**

Although there has been a 20% fall in veal production in France since 1988, the annual level of production of veal since 1990 has remained at approximately 275,000 tonnes from a total of 2.3 million calves reared in specialist units (3).

In addition to the direct economic and social benefits, veal production utilises approximately 30% of all calves born in France, derived mainly from dairy herds. This is an important factor in regulating red meat production, which is largely in surplus within the EU (3).

With an average carcass weight of 120 kg for slaughter at 18-19 weeks and a consumer market which specifically demands white meat, France differs considerably from some of its European partners. For example, Dutch veal (83% of which is exported) is a coloured meat, obtained mostly from calves slaughtered at 26-28 weeks, weighing 155-160 kg. This product is quite different from French veal, despite having the same "veal calf" label. Because of these differences arising from different cultures and traditions, it is difficult to adopt uniform rearing standards.

In France, which is the leading producer in Europe, 80% of veal comes from specialised units (3, 14). The great majority of calves are reared in individual pens with floors made from wooden slats. These pens measure, on average, 0.6-0.7 m x 1.6-1.7 m. The division between pens is usually a solid partition. The strictly fluid feed consists of a milk substitute prepared from powdered milk, distributed twice daily in individual buckets. The iron content of this feed is carefully restricted to produce a relative anaemia, resulting in a light-coloured meat.
Public opinion and various animal protection organisations have focused on these husbandry conditions, in the same way as battery cages for fowl, probably due to the relative absence of liberty imposed by both systems.

As early as 1980, it was clear from research on the husbandry conditions in these units, and on procedures for collecting and distributing calves (11), that the adverse circumstances to which these calves were exposed, and their sensitivity to imperfections in the systems of ventilation and feeding (9) had physiological consequences (Fig. 1).

As a result, various recommendations have been widely published, which are essentially based on respect for the physiology of the young animals and their sensitivity to adverse conditions (8).

Subsequently, there has been growing awareness of the following welfare problems:

- the poverty of the environment of the veal calf, which is deprived of contact with other calves
- the available space is cramped, making it impossible for the calf to adopt some lying postures
- the monotony of these conditions is interrupted only by two meals, each lasting a few minutes, and is manifested by abnormal behaviour, such as non-nutritive sucking, playing with the tongue, etc.

![Comparison of some haematological and biochemical values in unstressed calves (being suckled) and stressed calves (artificial feeding)](8)
Under pressure from some EU Member States, other husbandry systems (particularly adapted to the needs of heavy calves produced for export) have been recommended by both the Council of Europe and the EU, namely: group pens, provision of solid feed, abolition of iron-deficient regimes.

Group pens should provide each animal with a minimum floor space of 1.5 m² for a body weight of 150 kg. Otherwise, the EU Directive of 19 November 1991 permits rearing in crates, provided that the minimum width is 0.81 m (0.9 m ± 10%).

From 1 January 1994, and for a transitional period of four years, all new installations must conform to these minimum standards. While this concern for the comfort of calves can only be praised, the socio-economic implications of these changes may be readily imagined.

Faced with the confusion created by a single designation for two different products (white veal from light calves and coloured veal from heavy calves), the restrictive standards applicable to French producers of light calves (crate size or floor area of 1.5 m² for 150 kg body weight) do not take into account the body weights of 280-300 kg achieved by calves in some other EU Member States.

In France, various research workers (1, 2, 6, 7, 14, 15) – in collaboration with producers – have examined well-being as a function of installation. It has been demonstrated that, although the group pen encourages social contact between calves and certain forms of activity, this is less favourable than the individual crate for the adoption of various postures which form the behaviour pattern of calves (1).

Because of the risk of being trampled, the calf in a group pen tends not to stretch its legs. In addition, calves in group pens tend to produce a more coloured meat and, from the health aspect, there is less possibility of individual surveillance of animals in group pens.

It was partly for health reasons that the group pen with automatic feeder was abandoned in France in the 1970s.

Objective assessment of different husbandry systems is important, because the current option of choosing between the group pen and individual crates (0.90 m ± 10%) may not be definitive. In fact, the EU Directive of 19 November 1991 stipulates that the European Commission shall submit to the Council, no later than 1 October 1997, a report of the Veterinary Scientific Committee on a system or systems of intensive husbandry which meet requirements for the well-being of calves, as well as the socio-economic implications of the different systems.

For this reason, it is important to conduct studies to arrive at a management system which will best respond to the sole objectives of well-being, to the extent that this remains compatible with the socio-economic goals of producers and consumers, bearing in mind differences between countries.

**INTENSIVE PRODUCTION OF YOUNG CATTLE**

In 1992, total beef production in France (excluding veal) amounted to 1.6 million tonnes, of which a total of 450,000 tonnes was contributed by young cattle (mainly young bulls) slaughtered at 16-18 months with a carcass weight of approximately 380 kg (13).

These animals are provided by dairy herds or suckler herds, and the animals are two to three weeks old upon arrival in the rearing unit in the first case, and seven to eight months old in the second case.
Calves from dairy herds are reared until four to five months of age in group pens on straw, with free movement, social contacts and varied feeding, fulfilling all requirements of the EU Directive of 19 November 1991 (minimum standards for calf welfare).

"Disbudding" or removal of the horn bud is not prohibited (even without anaesthesia) in calves less than four weeks old (draft Recommendation adopted by the Permanent Committee of the Convention for the Protection of Farm Animals, on 21 October 1988).

In the case of suckled calves (broutards) over six months of age (and therefore regarded as adult), the above recommendation on disbudding still applies, and disbudding performed upon arrival at the finishing unit is regarded as a surgical operation, to be conducted under anaesthesia by a veterinarian.

At seven to eight months of age in the case of suckled calves and four to five months for dairy calves, the animals are regrouped for a fattening stage into groups of eight or ten, in pens provided with a slatted or concrete floor, or a concrete surface more or less covered with straw (a straw-covered slope or area). Each animal has an average floor space of 2.5-3.0 m². Animals have unlimited access to maize silage, supplemented by a concentrate of cereals, soya and a mineral mixture.

Among the disorders commonly observed in this type of husbandry, locomotor problems (evidently very painful) are the most frequent. These problems may originate in the feet (conditions resembling laminitis) or joints (arthrosis due to cartilaginous degeneration).

A large-scale investigation of these disorders has been conducted in western France (12), showing that joint lesions were far more common than indicated by lameness. Such lesions were due to excessively rapid growth coupled with an energy-rich diet, and were aggravated by slippery and traumatising flooring.

There was evidence of considerable changes in various parameters of bone metabolism (Table I) before the appearance of these disorders and after eight months of age, under the very different husbandry conditions of both dairy calves and suckler calves.

**Table I**

*Comparison of various plasma values in 66 young bulls from dairy herds and 66 from suckler herds at 8.5 months of age*

(12)

<table>
<thead>
<tr>
<th>Type of herd</th>
<th>Calcium (mg/l)</th>
<th>Phosphorus (mg/l)</th>
<th>Calcium Phosphorus</th>
<th>Lactates (mmol/l)</th>
<th>Alkaline phosphatase (U/l)</th>
<th>ASAT (U/l)</th>
<th>Hydroxy-proline* (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>93.3 ± 11</td>
<td>90.5 ± 12</td>
<td>1.04 ± 0.14</td>
<td>5.5 ± 2.1</td>
<td>218 ± 52</td>
<td>74.6 ± 12</td>
<td>19.2 ± 12</td>
</tr>
<tr>
<td>Broutards</td>
<td>87.8 ± 5</td>
<td>55 ± 11</td>
<td>1.68 ± 0.49</td>
<td>2.9 ± 2.4</td>
<td>65.2 ± 37</td>
<td>66.6 ± 22</td>
<td>13.8 ± 22</td>
</tr>
<tr>
<td>Difference P&lt;</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.05</td>
<td>0.001</td>
</tr>
</tbody>
</table>

* values for two batches of ten calves
ASAT: aspartate aminotransferase
A study of the effect of husbandry conditions on the behaviour of young bulls, conducted in 1992 and 1993, provided a precise definition of the conditions of well-being and suffering in confined young bulls (5).

The following flagrant anomalies in husbandry conditions were found:

- Inadequate trough space and failure to mix the appetising concentrate evenly with the whole ration led to competition which, in turn, gave rise to aggressive behaviour incompatible with calmness and resting.

- Animals were frequently reluctant to lie down or stand up, indicating the presence of joint pain. This confirmed the previous study (11) by demonstrating the effect of the type of flooring and the weight of the animal (Tables II, III and IV).

- Errors in the design of troughs and the water supply led to abnormal postures and inadequate drinking.

All of these anomalies encountered on the farm have obvious repercussions on the well-being of the animals, and some cause unacceptable suffering. Simple and cheap solutions to such problems exist (5).

### Table II

*Frequency of abnormal lying down postures (as a percentage of all calves lying down) in relation to type of flooring (a study of 47 groups)*

<table>
<thead>
<tr>
<th>Type of floor</th>
<th>Abnormal lying down (%)</th>
<th>No. of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete slats</td>
<td>27.2 (a)</td>
<td>250</td>
</tr>
<tr>
<td>Straw-covered slope</td>
<td>7.35 (b)</td>
<td>204</td>
</tr>
<tr>
<td>Deep litter</td>
<td>0.44 (b)</td>
<td>229</td>
</tr>
<tr>
<td>At pasture</td>
<td>2.2 (b)</td>
<td>90</td>
</tr>
</tbody>
</table>

$\chi^2$: significant relationship at a threshold of 1:1,000

Results with the same letter [(a) or (b)] are not significantly different

### Table III

*Frequency of abnormal lying down movements (as a percentage of all calves lying down) in relation to floor slipperiness (study conducted on 19 batches)*

<table>
<thead>
<tr>
<th>Floor slipperiness</th>
<th>Abnormal lying down (%)</th>
<th>No. of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slippery</td>
<td>45.0 (a)</td>
<td>111</td>
</tr>
<tr>
<td>Moderately slippery</td>
<td>10.6 (b)</td>
<td>132</td>
</tr>
<tr>
<td>Not slippery</td>
<td>6.9 (b)</td>
<td>158</td>
</tr>
</tbody>
</table>

$\chi^2$: significant at a threshold of 1:1,000

Results with the same letter [(a) or (b)] are not significantly different
**TABLE IV**

*Frequency of abnormal lying down movements (as a percentage of all calves lying down) in relation to surface area per animal (study conducted on 10 batches of young bulls on slatted flooring)*

(5)

<table>
<thead>
<tr>
<th>Surface area per calf (in m²)</th>
<th>Abnormal lying down (%)</th>
<th>No. of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2-2.4</td>
<td>44.3 (a)</td>
<td>88</td>
</tr>
<tr>
<td>2.5-3.5</td>
<td>15.7 (b)</td>
<td>134</td>
</tr>
</tbody>
</table>

χ²: significant at a threshold of 1:1,000
Results with the same letter [(a) or (b)] are not significantly different

**High pH in meat**

Although transport to the abattoir is dealt with in other contributions to this issue of the *Scientific and Technical Review*, mention should be made of the effect on carcass pH of the stress to which young bulls are subjected during transport to the abattoir.

The duration of the journey, conditions of collection (occasionally mixing with culled females), and the duration and conditions of holding before slaughter all generate stress which exhausts the glucose reserves of the animal, precluding the normal fall in muscle pH.

Such “high pH” meat (above pH 6.0 at 24 h after slaughter) is firm and dark, and has a shorter storage life than normal meat (10).

Such anomalies should be prevented, as they reflect anxiety and discomfort. This is also an economic necessity, as meat with high pH has much reduced value.

**CONCLUSION**

Some aspects of the husbandry of veal calves and young cattle in intensive units are capable of producing discomfort in the animal, and could cause some degree of physical or psychological suffering.

Livestock farmers must be aware of the effect of these factors, and the experience of the authors has shown that organisations of beef producers (representing 10-11% of production in France) which have taken part in various ecological-pathological experiments conducted by the authors, understand perfectly the ethical and economic implications of this work.
REFERENCES


