SUSTAINABLE BEEF QUALITY FOR EUROPE –
A Workshop for Industry and Scientists
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Application of beef quality research in Italy

Prof. V. Dell'Orto
Department of Health, Animal Science and Food Safety
University of Milan

UNIVERSITÀ DEGLI STUDI DI MILANO
FACOLTÀ DI MEDICINA VETERINARIA

Dipartimento di
Scienze veterinarie per la Salute
la Produzione animale
e la Sicurezza alimentare
Vespa

Agenda

- ✓ Italian beef production
- ✓ The main research outcomes currently applied in the Italian beef industry
- ✓ Future developments

Italian beef production and consumption (2013)

Country	Production (tones)	Consumption (kg/inhabitant/year)
France	1 407 900	23.2
Germany	1 106 000	13.3
Italy	**855 320**	**19.5**
UK	847 660	16.9
Ireland	495.324	20.0
Spain	580 840	9.3
Netherland	379 100	12.7
Poland	339 020	1.8
Belgium	249 910	15.7
Austria	227 200	18.0
Denmark	125 200	21.7

EU Commission, 2014

Italy is the 3rd beef producer. Beef consumption in one of the higher in EU

key player in EU beef market

Italian beef industry

Around 80% of beef cattle are produced in the Po Valley (4,8 mln Ha)

INTENSIVE FARMS

- 500-10.000 heads/year
- Salaried employers
- High level of technology and mechanization

Italian beef industry

Fattening of young cattle imported from abroad

Beef herds

Birth

male and female calves
200-450 kg LW

Weaning

Import
mainly Limousine and Charoilaise from France

Fattening
(5-10 months)

Slaughtering

Bullock
600-750 kg LW
330-480 kg CW
Heifers
450-550 kg LW
250-350 CW

Dairy herds

Birth

Male calves

40-55 kg LW

Fattening

Veal calves

230-350 kg LW

120-180 kg CW

Slaughtering

LW → live weight

CW → carcass weight

Italian autochthonous beef breeds

Piemontese

Romagnola

Maremmana

Podolica

Marchigiana

Chianina

Breed	Cows in herdbook
Piemontese	**269.202**
Marchigiana	23.920
Chianina	21.855
Podolica	16.847
Romagnola	6.843
Maremmana	6.073

Italian beef industry

Examples of a typical Italian silage-based diet for Charolaise cattle

	Adaptation	Fattening	Finishing
Corn Silage 32 % dm, kg	8.0	10.0	10.0
Wheat straw, kg	1.0	0.8	0.7
Dried beet pulp, kg	1.6	1.3	1.0
Soybean meal 44% CP, kg	1.0	1.8	2.0
Corn meal, kg	1.2	3.1	5.0
Vitamin-Mineral mix, kg	0.15	0.2	0.2
DMI, kg	6.8	9.5	11.0
UFC/kg d.m.	0.90	0.98	1.03
CP, % d.m.	12.52	15.03	15.04
RUP, % CP	25.85	25.23	26.35
RDP, % CP	74.25	74.77	73.65
SP	35.00	31.21	29.61
NDF, % d.m.	40.55	32.66	28.39
peNDF, % d.m.	30.72	23.58	19.73
NFC, % d.m.	38.59	45.22	50.29
Starch, % d.m.	23.29	32.11	38.93
EE, % d.m.	2.56	2.98	3.30
Ca, % d.m.	0.82	0.75	0.64
P, % d.m.	0.33	0.31	0.32

Average parameters	Charolaise	Limousine
Arrival weight, kg	400-500	280-350
Slaughter weight, kg	670-750	580-630
AGD, kg/d	1.45-1.55	1.35-1.45
Dressing percentage, %	59-61	61-63

Italian beef industry

Bovine slaughtered in Italy in 2013

	Animals (n°)	Live weight (ton)	%	Average live weight (kg)	Dressing %
Veal calves	744 358	182 498	24.7	245	58.1
Bullocks (steers negligible)	1 165 071	726 901	38.7	624	58.6
Heifers	546 458	281 809	18.2	516	56.3
Steers > 4yrs old	10 251	5 851	0.3	571	56.2
Bulls	33 467	24 405	1.1	729	56.4
Cows	507 953	284 154	16.9	559	47.2
Overall	**3 007 558**	**1 505 617**	**100.0**	**501**	**55.9**

ERSAF, 2014

Factors affecting perceived beef quality

Consumers behavior is affected not only by eating experience

Other drivers don't have to be overlooked

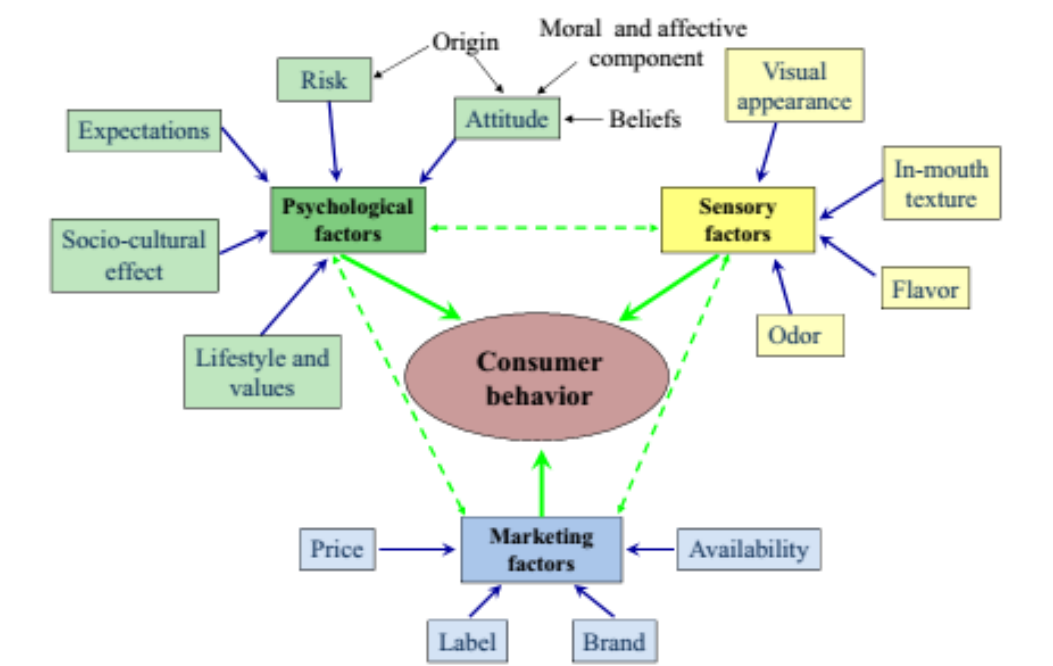
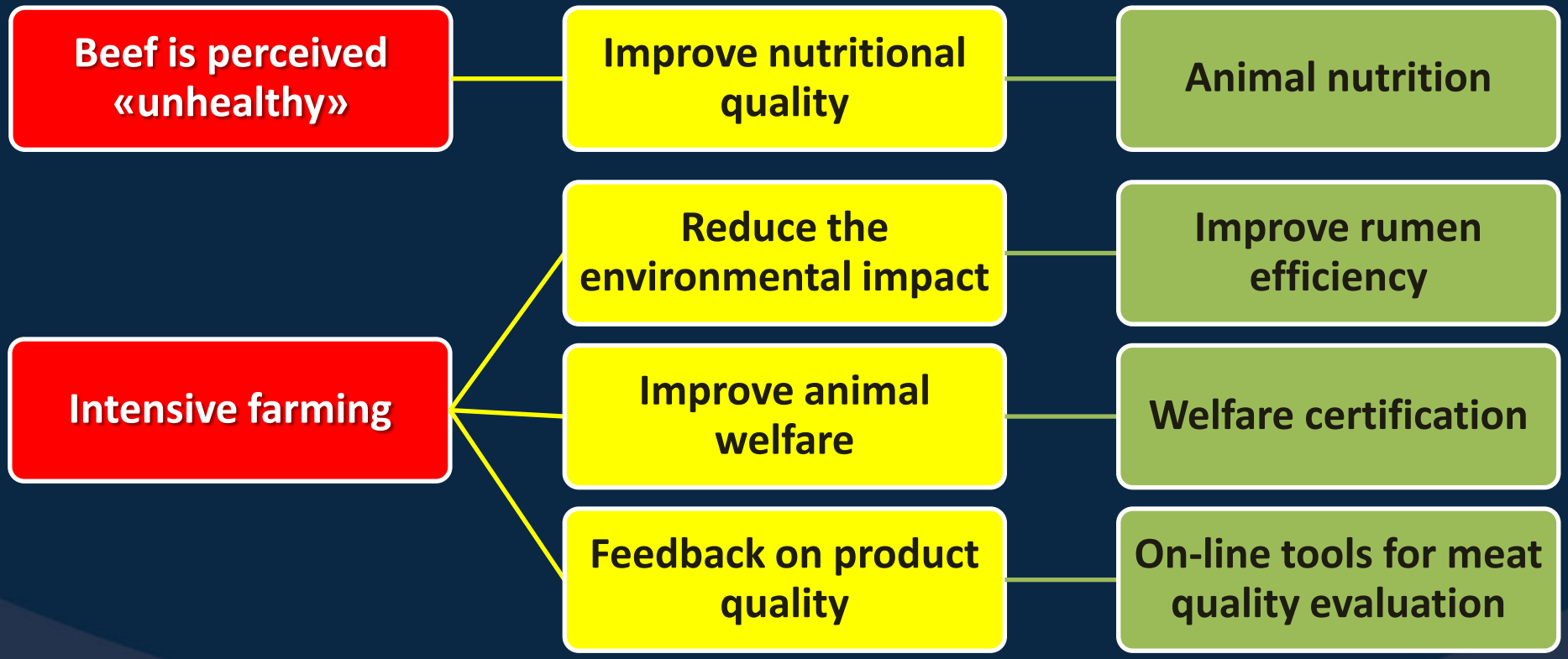


Fig. 2. Multidisciplinary model of the main factors affecting consumer behavior in a food domain.

Font-i-Furnols and Guerrero, 2014

Research application in Italian beef industry

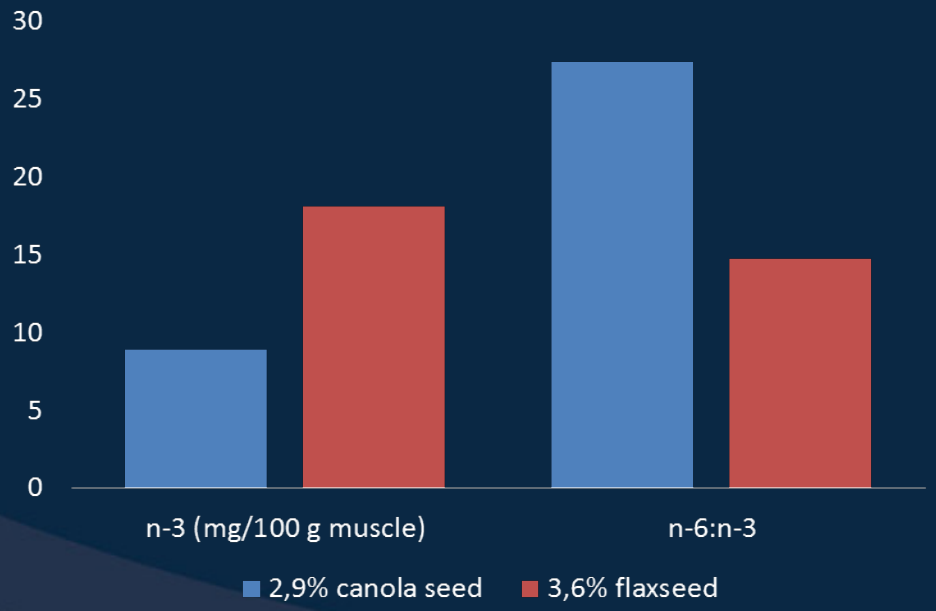


Improve nutritional quality

In some Italian premium production, cattle are fed flaxseed to improve beef n-3 content. This doesn't affects meat sensory characteristics

A step foreword: food safety → "nutritional safety"

Total n-3 FA and n-6:n-3 ratio in beef muscle from cattle fed canola or linseed



Mach et al., 2006

Table 1. Triangle test evaluating the sensory similarity of beef from bullocks (both, IS or IH) fed on diet without or with linseed (8% on DM basis)

	IS-linseed *vs.* IS	IH-linseed *vs.* IH
Total answers (no.)	72	72
Correct answers (no.)[1]	31	30
Discriminating pop. (%)[2]	25.8	23.7

[1] no. of consumers that correctly identified the odd sample in the triad.
[2] Maximum percentage of the population that, with a probability of 90% (β-risk, i.e. the probability that no perceptible difference exist when one does, equal to 0.10) can distinguish the beef samples.

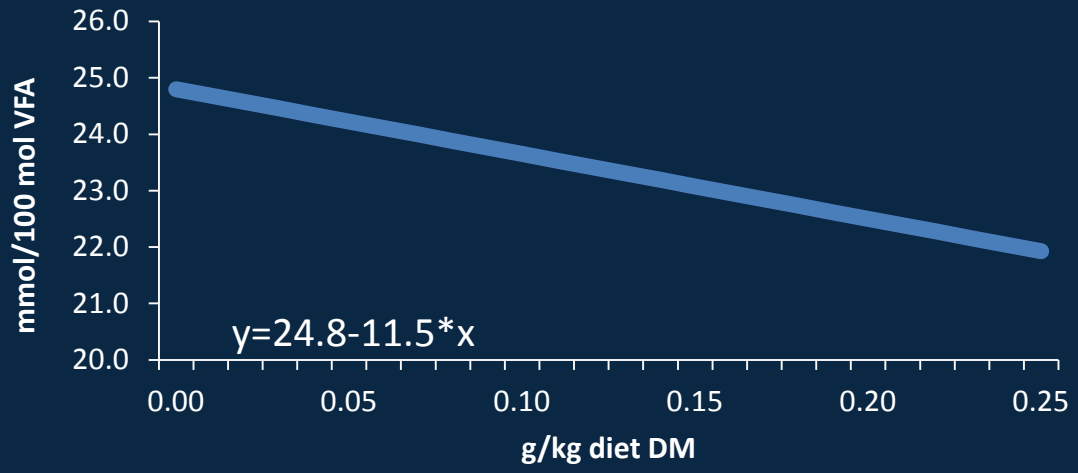
Corazzin et al., 2012

Improve rumen efficiency

Growing utilization of essential oils and their bioactive compounds in beef cattle diets

Essential oils and their active components reduce rumen methane production and increase propionate:acetate ratio in beef cattle

Effects of essential oils and their bioactive compounds administration on methane production in beef cattle (meta-analysis)



Khiaosa-ard and Zebeli, 2013

For beef cattle, at the greatest dose (0.25 g/kg diet DM) methane production was **decreased by 12%** compared with the control treatment.

Anise oil, Thymol, Eugenol, Vanilin, Limonene, Capsaicin, Guaiacol, Cinnamaldehyde

On-farm welfare monitoring and certification

Welfare Quality®
Assessment protocol for cattle

	Welfare Criteria	Measures
Good Feeding	Absence of prolonged hunger	Body Condition Score
	Absence of prolonged thirst	Water provision, cleanliness of water points, number of animals using the water points
Good housing	Comfort around resting	Time needed to lie down, cleanliness of the animals
	Thermal comfort	As *yet, no measure is developed*
	Ease of movement	Pen features according to live weight, access to outdoor loafing area or pasture
Good health	Absence of injuries	Lameness, integument alterations
	Absence of disease	Coughing, nasal discharge, ocular discharge, hampered respiration, diarrhoea, bloated rumen, mortality
	Absence of pain induced by management procedures	Disbudding/dehorning, tail docking, castration
Appropriate behaviour	Expression of social behaviours	Agonistic behaviours, cohesive behaviours
	Expression of the other behaviours	Access to pasture
	Good human-animal relationship	Avoidance distance
	Positive emotianl state	Qualitative behaviour assessment

On-farm welfare monitoring and certification

Lombardy and Emilia Romagna Experimental Zooprophylactic Institute (IZSLER), National Reference Center for Animal Welfare (CReNBA), developed for the Italian beef cattle rearing system a welfare and biosecurity assessment system.

46 OBSERVATIONS for 4 areas:

- **Farm management and personnel (**13 observations)
- **Facilities and equipment (**16 observations)
- **Animal based measures (**13 observations)
- **Microclimate and alarm system** (4 observations)

3 final evaluations :

- **Overall welfare score**
- **Area score**
- **Noncompliance with law**

ANIMAL WELFARE ASSESSMENT	Score	(Min - Max)	Percentage
FARM MANAGEMENT AND PERSONNEL	40.64	(15.15 – 50.95)	71.20%
FACILITIES AND EQUIPMENT	44.09	(15.3 – 58.9)	66.03%
ANIMAL-BASED MEASURES	62	(16 - 75)	77.97%
INSPECTION OF MICROCLIMATIC ENVIRONMENTAL CONDITIONS AND ALARM SYSTEMS	11.5	(5 – 14.5)	68.42%
OVERALL ANIMAL WELFARE ASSESSMENT	158.23	(51.45 – 199.35)	**72.20 %**
BIOSECURITY	38	(14.5 - 52)	**62.67 %**

Bertocchi and Fusi, 2014

On-farm welfare monitoring and certification

Future step: welfare labelling

Opinion of the European Economic and Social Committee on the 'Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Options for animal welfare labelling and the establishment of a European network of reference centres for the protection and welfare of animals'

COM(2009) 584 final

(2011/C 21/08)

1.1 A labelling scheme is needed that gives consumers objective information to enable them to choose animal products that exceed EU minimum animal welfare requirements. The labelling should provide an identifiable guarantee based on reliable information that consumers can readily understand.

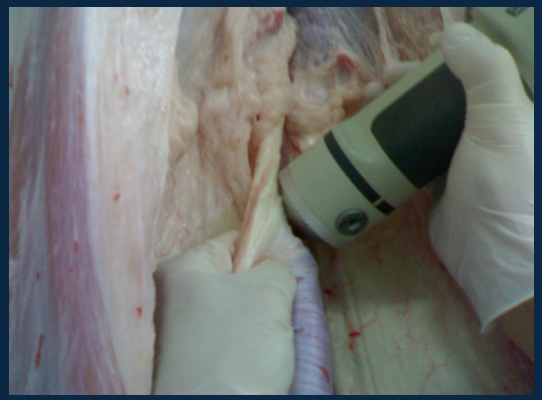
On-line tools for meat quality evaluation

Objective measurement of veal color for classification purposes

C. Denoyelle*, F. Berny

Meat Science 53 (1999) 203–209

MEAT SCIENCE



- ✓ Chromameter is currently utilized in some of the biggest Italian abattoirs for color classification of veal carcasses.
- ✓ Objective carcass color class comes up from a regression model developed by Italian researchers following the approach of Denoyelle and Berny (1999)
- ✓ Given the full traceability of veal, color classification from this technology represents a reliable and useful feedback for the farmer about product quality.

Instrumental objective measurement of veal calves carcass colour at slaughterhouse

Stefano Vandoni, Carlo Angelo Sgoifo Rossi

$$\text{Colour score} = 10.50106 - 0.38185(L^*) - 0.02906(b^*) + 0.00316(L^{*2}) - 0.00678(b^{*2}) - 0.00602(L^* \times a^*) + 0.47206(\text{Chr})$$

Ital.J.Anim.Sci. vol. 8 (Suppl. 2), 552-554

Future developments

ON FARM

- ✓ **Genetic selection**
  - ✓ meat quality traits (tenderness, marbling...)
  - ✓ feed efficiency
- ✓ **Responsible use of antibiotics for therapy**
  - ✓ risk assessment
  - ✓ preventive strategies (vaccination, nutrition …)


Contents lists available at ScienceDirect

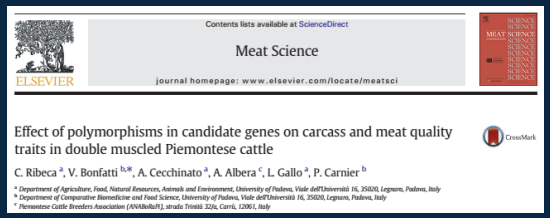
Meat Science

journal homepage: www.elsevier.com/locate/meatsci

Genetic parameters of carcass and meat quality traits of double muscled Piemontese cattle

A. Boukha [a], V. Bonfatti [a], A. Cecchinato [a,*], A. Albera [b], L. Gallo [a], P. Carnier [a], G. Bittante [a]

[a] Department of Animal Science, University of Padova, Viale dell'Università 16, 35020 Legnaro (PD), Italy
[b] Associazione Nazionale Allevatori Bovini di Razza Piemontese, Strada Trinità 32a, 12061 Carrù, Italy


Contents lists available at ScienceDirect

Meat Science

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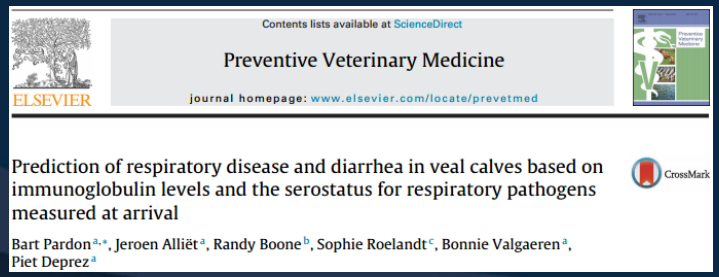
Effect of polymorphisms in candidate genes on carcass and meat quality traits in double muscled Piemontese cattle

C. Ribeca [a], V. Bonfatti [b,*], A. Cecchinato [a], A. Albera [c], L. Gallo [a], P. Carnier [b]

[a] Department of Agriculture, Food, Natural Resources, Animals and Environment, University of Padova, Viale dell'Università 16, 35020, Legnaro, Padova, Italy
[b] Department of Comparative Biomedicine and Food Science, University of Padova, Viale dell'Università 16, 35020, Legnaro, Padova, Italy
[c] Piemontese Cattle Breeders Association (ANABoRaPi), strada Trinità 32/a, Carrù, 12061, Italy


Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

Prediction of respiratory disease and diarrhea in veal calves based on immunoglobulin levels and the serostatus for respiratory pathogens measured at arrival

Bart Pardon [a,*], Jeroen Alliët [a], Randy Boone [b], Sophie Roelandt [c], Bonnie Valgaeren [a], Piet Deprez [a]


C.A. Sgoifo Rossi et al. Large Animal Review 2013; 19: 65-72

Determination and assessment of BRD risk factors in newly received beef cattle

Future developments

POST FARM

- ✓ Improve SEUROP carcass classification in cooperation with other EU members
  - ✓ not related with eating quality (e.g. MSA, USDA)
- ✓ More informative on-line tools (meat quality, carcass classification, genetic improvement)
  - ✓ e.g. spectroscopy (NIR, Raman…), Visual Image Analysis (VIA)
- ✓ Post-slaughter technologies
  - ✓ technologies to improve aspect and shelf life

Thank you for the attention