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TOOLS FOR ASSESSING SUSTAINABILITY OF PIGMEAT PRODUCTION SYSTEMS

S A Edwards,
J-Y Dourmad, H L Edge, E Fabrega, K de Greef,
E Ilari, C Phatsara, L Rydhmer, M Bonneau

Q-PORKCHAINS

Project Objective:

To develop high quality pork products in sustainable production systems with low environmental impact

Module II:

Sustainability of farm level production systems

Challenges for Pigmeat Production Systems

1. **increasing social rejection of the current intensive systems due to environmental and animal welfare shortcomings**
2. **lack of economic competitiveness on the world market**
3. **loss of diversity due to pressures on small-scale systems adapted to local conditions.**

Module II Objective

To survey the range of existing systems within Europe and evaluate these against sustainability benchmarks

Therefore – need to agree standardised tools for the assessment of sustainability of pigmeat production systems

Sustainability

- **World Commission on Environment and Development (1987)**
  - **Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs**
- **Crossen (1992)**
  - **A sustainable agricultural system is one that can indefinitely meet the requirements for food and fibre at socially acceptable, economical and environmental costs.**

The Sustainability Tripod

Sustainability

Environmental

Social **Economic**

Review of tools

Theme	Lead partner	Person responsible
Environmental impact	INRA	Jean-Yves Dourmad
Genetic resources	SLU	Lotta Rydhmer
Economic sustainability	IFIP	Estelle Ilari
Human working conditions	Newcastle	Helen Edge
Animal welfare	Newcastle	Helen Edge
Animal health	Bonn	Chirawath Phatsara
Meat safety	Bonn	Chirawath Phatsara
Meat quality	IRTA	Emma Fabrega
Societal conformity	ASGV	Karel de Greef

Tool Review and Nomination

- **Review of scientific literature and practice**
- **SWOT analyses**
- **Nomination of the best currently available tool for the pigmeat production context**
- **Production of Standard Operating Procedure**
- **Identification of benchmarks**

ENVIRONMENTAL IMPACT

- **Scope of tool**

Many potential aspects
- eutrophication
- acidification
- climate change
- use of non-renewable energy

Needs to consider the whole production chain
- Processes occurring on farm
- Production and delivery of inputs

ENVIRONMENTAL IMPACT

- Tools reviewed

Target group	**Indicators**
Policy makers	Means based
Farmers	Effect based
Meat industry	System-state related
Environmental issue	**System considered**
Global	Farm
Local	Product

ENVIRONMENTAL IMPACT

- Tool nominated

Life Cycle Assessment:
an holistic analysis taking into account local and global impacts

Inputs – pigs, feed, energy, chemicals
Outputs – pigs, manure
Emissions – estimated from systems description

GENETIC RESOURCES

- **Scope of tool**

Assessment of the sustainability of the pig breeding programme
- Preservation of genetic diversity
- Contribution to other sustainability themes

GENETIC RESOURCES

- Tools reviewed

Tools for inbreeding estimation
- inbreeding rate from effective population size
- programmes for estimation of inbreeding
- frequency of heterozgotes at DNA level
- breed characterisation, DAD-IS

Sustainability checklists for breeding
- Assessment of breeding goals
- Code EFABAR

GENETIC RESOURCES

- Tool nominated

Wolliam's checklist for breeding schemes: (e.g.)
- how is the market defined?
- how is the breeding goal defined?
- how is sensitivity to external factors addressed?
- how is a sufficiently large effective population size secured?
- which traits are recorded?
- how is genetic progress monitored and evaluated?
- characteristics of the breed

ECONOMIC SUSTAINABILITY

- Scope of tool

Holistic analysis of economic health and profitability of whole farm

Ability to provide a correct and regular income to support a family and to be able to pass on a viable farm

ECONOMIC SUSTAINABILITY

- Tools reviewed
  - **IDEA and IDERICA (indicators of durability)**
  - **Sustainability diagnosis**
  - **Territorial observatory project**
  - **Sustainable farm tree (farmers opinions)**
  - **Australian sustainability indicator**
  - **RISE (response-inducing sustainability evaluation)**

ECONOMIC SUSTAINABILITY

- Tool nominated

Indicateurs de Durabilité des Exploitations Agricoles IDEA :
- Economic viability
  - Available income per worker
  - Economic specialisation rate
- Independence
  - Financial autonomy
  - Reliance on subsidies
- Transferability (operating capital)
- Efficiency (operating expenses: production value)

HUMAN WORKING CONDITIONS

- Scope of tool

Health and Safety at Work
- personal injury risk
- aerial environment

Demands of the Job
- number of animals under care
- degree of automation

Job Satisfaction

HUMAN WORKING CONDITIONS

- Tools reviewed

Aerial environment
– measurement of gases and airborne particles

Workload
– reports on man hours/pig

Job satisfaction
– questionnaires in other industries

HUMAN WORKING CONDITIONS

- Tool nominated

No current tool exists, so combined tool devised:

– a questionnaire on employee health and frequency of work based injuries (indirect measure of workplace safety)

– a check list for workload and degree of automation within the pig unit

– a job satisfaction questionnaire developed specifically for the project

ANIMAL WELFARE

- Scope of tool

Assessment of the adequacy to meet pig needs:
– health
– physiology
– behaviour

Must operate in diverse systems
– outcome measures more appropriate

ANIMAL WELFARE

- Tools reviewed

– Animal needs index
– Decision support tool
– Behaviour observation tool
– Qualitative assessment
– Farm assurance schemes
– Bristol Welfare Assurance programme
– Welfare Quality programme

ANIMAL WELFARE

- Tool Nominated

Welfare Quality:
integrates both animal based measures of pig health and behaviour, including qualitative assessment, with key resource measures of environmental provision

Condensed tool (if time or farm access limited):
a short “needs based” questionnaire

ANIMAL HEALTH

- Scope of tool

Assessment of the health status of animals
Early detection and elimination of disease risk factors
Early detection and treatment of disease

ANIMAL HEALTH

- Tools Reviewed

Laboratory analytical tools
- Diagnostic tools (cultures, ELISA, PCR)
- APP (Hapt, SAA, PigMAP)

Combined health assessment tools
- Monitoring and surveillance systems (MOSS)
- Herd health plans
- Information technology tools

ANIMAL HEALTH

- Tool nominated

Health questionnaire (basic tool):
- Health management checklist
- Vaccination programme record
- Medication records
- Disease and mortality report
- General health report

Acute phase proteins (advanced tool):
- Haptaglobin
- Pig MAP

MEAT SAFETY

- Scope of tool

Hygenic status of meat throughout production chain
Presence of zoonotic diseases

MEAT SAFETY

- Tools reviewed

General tools
- Laboratory analytical tools (mATP, PCR, APP)
- Monitoring tools (abattoir vet, Salmonella index)
- Statistical risk tools
- Hygiene tools (cleaning and disinfection)

Combined quality assurance tools
- Health management (HACCP, HAZOP, GMP)
- Quality management systems (TQM, GIQS)

MEAT SAFETY

- Tool nominated

Hazard Analysis and Critical Control Point
- A preventive system to ensure food safety
- Aims at identification and control of potential hazards at all stages in food production

HACCP checklists developed

Records from national Salmonella monitoring

MEAT QUALITY

- Scope of tool

Carcass quality
- grading criteria

Meat quality
- suitability for process
- consumer satisfaction

MEAT QUALITY

- Tools reviewed

At farm
- Prediction of fat and muscle depths by ultrasound

At slaughter plant (on line)
- Carcass grading parameters (weight, fat/ muscle depth)
- Muscle properties (pH, conductivity, colour, marbling)

In laboratory
- Muscle chemistry (WHC, intramuscular fat)

MEAT QUALITY

- Tool nominated

Assessment at abattoir:
- Lean percentage estimation
- Ultimate pH
- Drip loss (Rasmussen method)
- Colour assessment (Japanese colour scale)

SOCIETAL CONFORMITY

- Scope of tool

Assessment of the degree to which a production system meets the demands and expectations of the society

SOCIETAL CONFORMITY

- Tools reviewed

Societal expression of conformity
- Media and politics inventories
- Focus group discussions
- Social inventories – quantitative and qualitative surveys
- Social experiments

Production systems conformation actions
- Conformation to laws and regulations
- Participation in quality schemes
- Development of alternative systems
- Communication and transparency

SOCIETAL CONFORMITY

- Tool nominated

A questionnaire for informed professionals:
- Society (NGOs, journalists, government)
- Industry (producers, advisers, scientists)

Designed to assess degree of:
- awareness
- interest
- information
- approval

Applications of Tools

- All tools will be applied in a study of different production systems in each of 5 EU countries
- Data will be collected for 3 contrasting systems per country (2008-09)
  - 1 conventional, 2 alternative
- Alternative systems will be differentiated on one or more sustainability claims
  - Welfare
  - Environment
  - Traditional breeds

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