Animal health and welfare aspects of different housing and husbandry systems for pig production

Emma Fàbrega i Romans, IRTA
Sanco Training, 27-30 September 2011
OUTLINE

✓ Background

✓ Examples of housing and management aspects affecting welfare and health

✓ Monitoring systems and strategies for improvement
“Why zebras don’t get ulcers?”
R.M. Sapolsky (1998)

“Stress-related disease emerges, predominantly, out of the fact that we so often activate a physiological system that has evolved for responding to acute physical emergencies, but we turn it on for months on end, worrying about mortgages, relationships, and promotions.”
BACKGROUND

MULTIFACTORIAL DISEASES
BACKGROUND

Stimulus

CNS

Previous experiences
Age
Sex
Genetics
Individual traits
(Cognitive bias)

Stress response

Behavioural response

Physiological response

ANS
HPA axis

WELFARE
BACKGROUND

Response to anti-inflammatory signals

CRH and other releasing factors

CORTISOL RECEPTORS

CYTOKINE mediated inflammatory processes

GLUCOCORTICOIDs
BACKGROUND

Environmental Factors

Management Factors

Pathology Factors

Nutritional Factors

Social Factors

Individuals Factors (cognitive bias)
BACKGROUND

SUSTAINABILITY EVALUATION: HEALTH TOOL

Source: QPORKCHARNS PROJECT, Ulas Cinar
OUTLINE

✓ Background

✓ Examples of housing and management aspects affecting welfare and health

✓ Monitoring systems and strategies for improvement
EXAMPLES – GESTATING SOWS

SOME HEALTH AND WELFARE PROBLEMS IN GROUP HOUSED SOWS

✓ Aggression and other redirected injuries (vulva biting)

✓ Disease control

✓ Multifactorial diseases (PRRS…)

✓ Lameness (quality of flooring vs. Incapacity to move)

✓ …
EXAMPLES – GESTATING SOWS

SOME HEALTH AND WELFARE PROBLEMS IN GROUP HOUSED SOWS

Karlen et al., 2006

MORE CHALLENGES AT THE BEGINNING: AGGRESSION

MORE CHALLENGES AT THE END: STRESS

ECOSHEDS/HOOPS

CONVENTIONAL STALLS
EXAMPLES – GESTATING SOWS groups and stalls

EFFECT OF HOUSING SYSTEM ON LAMENESS SCORE

<table>
<thead>
<tr>
<th></th>
<th>STALLS</th>
<th>HOOPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>% 2 or 3 Scoring at week 9</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>% 2 or 3 Scoring at week 15</td>
<td>13.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>

(Karlen et al., 2006)
**EXAMPLES – GESTATING SOWS groups and stalls**

**EFFECT OF HOUSING SYSTEM ON WBC COUNTS**

<table>
<thead>
<tr>
<th></th>
<th>STALL</th>
<th>HOOPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutrophil (%WBC)</td>
<td>46.0</td>
<td>41.0</td>
</tr>
<tr>
<td>Lymphocites</td>
<td>41.62</td>
<td>46.45</td>
</tr>
<tr>
<td>Neu/Lymp ratio</td>
<td>1.22</td>
<td>0.939</td>
</tr>
</tbody>
</table>

- **Redistribution in WBC counts**

  - NEUTROS
  - LYMPHOS

(Karlen et al., 2006)
### EXAMPLES – GESTATING SOWS groups and stalls

#### EFFECT OF HOUSING SYSTEM ON FEAR TO HUMANS

<table>
<thead>
<tr>
<th></th>
<th>STALL</th>
<th>HOOPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withdrawal (%)</td>
<td>64</td>
<td>24</td>
</tr>
<tr>
<td>Return after withdrawal (s)</td>
<td>13.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Total feeding time (s)</td>
<td>16.6</td>
<td>24.0</td>
</tr>
</tbody>
</table>

FEAR AS STRESS INDICATOR???

(Karlen et al., 2006)
EXAMPLES – LACTATING SOWS

FARROWING CRATES VS. LOOSE FARROWING SYSTEM

PIGLET MORTALITY

SOW WELFARE AND RECOVERY

ENVIRONMENT

HEALTH
EXAMPLES – LACTATING SOWS

EFFECT OF FARROWING PEN TYPE AND SEASON ON SOW AND LITTER PERFORMANCE AND AIR QUALITY

- MOD PENS BENEFICIAL TO SOWS AND PIGLETS IN HOT SEASON NOT COOL
- AIR QUALITY AFFECTED BY TYPE OF PEN AND SEASON

(Farmer et al., 2006)
EXAMPLES – LACTATING SOWS

EFFECT OF FARROWING PEN TYPE AND SEASON ON SOW AND LITTER PERFORMANCE AND AIR QUALITY

<table>
<thead>
<tr>
<th></th>
<th>21°C</th>
<th></th>
<th>29°C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STD</td>
<td>MOD</td>
<td>STD</td>
<td>MOD</td>
</tr>
<tr>
<td>Sow Weight at weaning (kg)</td>
<td>177.3</td>
<td>175.9</td>
<td>156.0</td>
<td>169.3</td>
</tr>
<tr>
<td>Backfat thickness at weaning (mm)</td>
<td>15.3</td>
<td>15.1</td>
<td>10.9</td>
<td>12.3</td>
</tr>
<tr>
<td>Feed intake week 3 lactation (l/day)</td>
<td>5.78</td>
<td>5.90</td>
<td>4.19</td>
<td>5.16</td>
</tr>
<tr>
<td>Water use (l/day)</td>
<td>21.3</td>
<td>25.9</td>
<td>32.2</td>
<td>58.9</td>
</tr>
</tbody>
</table>

(Farmer et al., 2006)
EFFECT OF FARROWING PEN TYPE AND SEASON ON SOW AND LITTER PERFORMANCE AND AIR QUALITY

<table>
<thead>
<tr>
<th>AMMONIA EMISSIONS (ppm)</th>
<th>SEASON</th>
<th>21°C</th>
<th>29°C</th>
<th>PEN TYPE</th>
<th>STD</th>
<th>MOD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8.12</td>
<td>12.95</td>
<td></td>
<td>9.41</td>
<td>11.70</td>
</tr>
<tr>
<td>METHANE EMISSIONS (ppm)</td>
<td></td>
<td>7.70</td>
<td>9.06</td>
<td></td>
<td>6.39</td>
<td>10.37</td>
</tr>
</tbody>
</table>

(Farmer et al., 2006)

CARBON FOOTPRINT ??

NOT SO EASY...
“From a general point of view, all the measures that could help to lower all stressful conditions such as, successive mixing or bad rearing and hygiene conditions might be of interest to lower PMWS expression.”

(Rose et al., 2004)
# EXAMPLES – WEANING

## POST WEANING MULTISYSTEMIC WASTING SYNDROME (PMWS), A MULTIFACTORIAL DISEASE

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average pen area in weaning facilities $&gt; 7.8 \text{ m}^2$</td>
<td>3.2</td>
</tr>
<tr>
<td>Setting up a pre-nursery for early-weaned piglets</td>
<td>0.1</td>
</tr>
<tr>
<td>Separated pit for adjacent rooms</td>
<td>0.9</td>
</tr>
<tr>
<td>Collective rearing of sows during pregnancy</td>
<td>0.3</td>
</tr>
<tr>
<td>PRRSv Status of 20-week old fattening pigs ($&gt; 50%$ positives)</td>
<td>6.5</td>
</tr>
</tbody>
</table>

(Rose et al., 2004)
EXAMPLES – GROWING PIGS

EFFECT OF HOUSING ENVIRONMENT AND SURGICAL CASTRATION ON THE IMMUNE FUNCTION OF FATTENING MALE PIGS

✓ ANDROGENS STIMULATE MATURATION OF IMMUNE SYSTEM IN JUVENILE PIGS (CONTRARY TO ADULTS)

✓ NO EFFECT OF HOUSING SYSTEM

(Merlot et al., 2010)
**EXAMPLES – GROWING PIGS**

EFFECT OF HOUSING ENVIRONMENT AND SURGICAL CASTRATION ON THE IMMUNE FUNCTION OF FATTENING MALE PIGS

<table>
<thead>
<tr>
<th></th>
<th>SLATTED FLOOR</th>
<th></th>
<th>ENRICHED ENVIRONMENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Castrates</td>
<td>Entires</td>
<td>Castrates</td>
<td>Entires</td>
</tr>
<tr>
<td>Leucocytes at M5</td>
<td>18.2</td>
<td>24.3</td>
<td>22.3</td>
<td>27.5</td>
</tr>
<tr>
<td>(x1000/ml blood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Lymphocytes at M5</td>
<td>58.9</td>
<td>62.3</td>
<td>57.0</td>
<td>62.1</td>
</tr>
<tr>
<td>% Granulocytes at M5</td>
<td>39.3</td>
<td>36.4</td>
<td>41.3</td>
<td>36.4</td>
</tr>
<tr>
<td>Thymus weight</td>
<td>2.5</td>
<td>3.3</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>(g/kg live weight)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Merlot et al., 2010)
EFFECT OF SPLIT MARKETING ON SKIN LESIONS

(Fàbrega et al., 2011)
OUTLINE

✓ Background

✓ Examples of housing and management aspects affecting welfare and health

✓ Monitoring systems and strategies for improvement
MONITORING SYSTEMS

A PYRAMID FOR HEALTH AND WELFARE MONITORING AND PREVENTION

PLF TECHNOLOGIES

HEALTH AND WELFARE RECORDS

GOOD STOCKMANSHIP

BIOSECURITY
Don’t you think that you are going a bit far away with this welfare issue?

Ohhs! Do you need a bit of room?
MONITORING SYSTEMS

GOOD STOCKMANSHIP

IS IT A QUESTION OF

✓ FORMATION
✓ JOB SOCIAL PERCEPTION
✓ WORKING CONDITIONS

EG.WC Included in the SUSTAINABILITY tools in QCHAINS
MONITORING SYSTEMS

HEALTH AND WELFARE RECORDS

✓ RECORDS OF “NORMAL” ON FARM INFORMATION
  (respiratory and digestive signs, behaviour, body condition, treatments…)

✓ RECORDS OF ON LINE ABATTOIR INFORMATION
  (respiratory and digestive tracts, lesions…)

✓ DISEASE CONTROL PROGRAMS: SALMONELLA
  (DANISH SYSTEM), PRRS…

✓ DETECTION OF SUBCLINICAL STATES: ACUTE
  PHASE PROTEINS ??
MONITORING SYSTEMS

HEALTH AND WELFARE RECORDS

ACUTE PHASE PROTEINS AFTER VACCINATION AGAINST BOAR TAINT

(Fàbrega et al., 2010)
MONITORING SYSTEMS

PLF TECHNOLOGIES

SOME EXAMPLES

✓ ANIMAL VOCALIZATIONS:
  stress indicator, adaptability to temperature (Moura et al., 2008; Hillman et al. 2004)

✓ COUGH RECORDS:
  early detection of respiratory disease (Exadaktylos et al., 2008; Guarino et al., 2008; soundtalks…)

✓ STATIC CLAW PRESSURE DISTRIBUTION:
  lameness prediction (de Carvalho et al., 2009)
MONITORING SYSTEMS

PLF TECHNOLOGIES

BUT...WHY THEY ARE NOT AS WIDESPREAD AS EXPECTED?

✓ TOO EARLY
✓ NEED MORE DEVELOPMENT
✓ FINE-TUNING WITH FARMERS’ NEEDS
✓ TOO EXPENSIVE
✓ ...

Page 31
CONCLUSIONS?

ANIMAL WELFARE

ANIMAL HEALTH

PROBABLY NOT..BUT THERE IS ROOM FOR IMPROVEMENT…

OUR LOVE CAN NEVER BE
MANY THANKS FOR YOUR ATTENTION!!!

emma.fabrega@irta.cat