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LARGE SCALE PIG FARMING SYSTEMS OPPORTUNITIES & CHALLENGES

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WHAT IS LARGE SCALE?

● Corporate ownership

- large no of animals per company
- may be over many sites

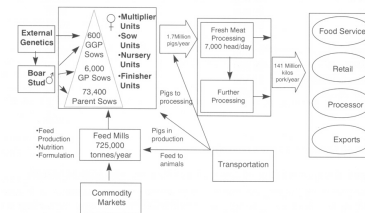
● Large herd size

- large no of animals per site

INTEGRATED PRODUCTION

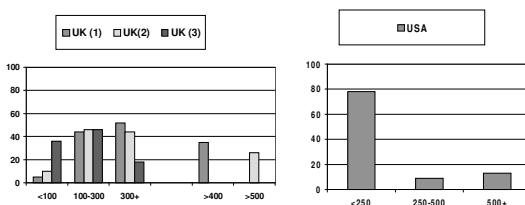
USA 2000:

10 largest companies controlled ~20% of all breeding sows



(Hardy, 1997)

HERD SIZES



ECONOMIES OF SCALE

- Purchasing and marketing
- Spreading of overhead costs
 - automation of processes
 - specialist consultancy
- Logistics of production

IMPROVED ECONOMIC EFFICIENCY

purchasing power

Herd size	1-99	-199	-299	-399	400+
<u>£/tonne</u>					
Sow feed	149	143	142	142	136
Grower feed	195	173	182	172	166

(PIC, 1998)

IMPROVED PRODUCTION EFFICIENCY

labour

Swine units (farrow to wean)

Enterprise size (litters)	≤175	>175
Hours/litter	6.0	4.3

(Langemeier, 1997)

IMPROVED PRODUCTION LOGISTICS

● Large contemporary batch sizes

- Dry sow housing: parity groupings
minimal mixing
- Farrowing: human supervision
cross fostering



IMPROVED PRODUCTION LOGISTICS

farrowing

	Control	Human intervention
Stillborn (%)	6.8	1.6
Died 0-24h (%)	5.2	2.5
Died 24h-weaning (%)	6.2	6.0
Total deaths (%)	18.2	10.1



(White et al, 1996)

IMPROVED PRODUCTION LOGISTICS

● Large contemporary batch sizes

- Dry sow housing: parity groupings
minimal mixing
- Farrowing: human supervision
cross fostering
- Health management: all-in all-out
site segregation
- Nutrition management: phase feeding



IMPROVED PRODUCTION LOGISTICS

all-in all-out

	AI AO cleaned	AI AO Not cleaned	Continuous flow
DLWG (g/d)	658	619	610
Viable bacteria (cfu/m ³)	132	177	201
Dust (mg/m ³)	1.80	2.31	2.51

(Cargill & Banhazi, 1998)

IMPROVED PRODUCTION LOGISTICS

all-in all-out

	AI AO	Continuous flow
<u>2-6 months</u>		
DLWG (g/d)	768	705
Days to market		+7.6
% lung lesions	26	76

(Purdue University, 1997)

IMPROVED PRODUCTION LOGISTICS

site segregation

% of herds	Small	Medium	Large
Separate nursery	35	45	75
Separate grow/finish	48	57	78

(USDA, 2001)

IMPROVED PRODUCTION LOGISTICS

site segregation

	On site	Off site	
<u>Day 12-21</u>			
DLWG (g/d)	104	189	**
Gain:feed	.67	.98	**
<u>Day 21-56</u>			**
DLWG (g/d)	433	506	
Gain:feed	.72	.76	*

(Patience et al., 2000)

Modelling Phase Feeding

30-95 kg (Sept 02 costs)

	Single feed	Two feeds	Three feeds
DLWG (g)	698	703	709
FCR	2.69	2.69	2.70
Feed cost (£/pig)	21.46	20.35	19.42
N excretion (kg/pig)	3.24	2.94	2.28

IMPROVED PRODUCTION LOGISTICS

phase feeding

	Small (<2,000)	Medium (2-10,000)	Large (>10,000)
% herds			
Reduce N by diet manipulation	7	17	40
Manure nutrient management plan	19	67	91

(USDA, 2001)

IMPROVED PRODUCTION ?

sow performance

Herd size	1-99	-199	-299	-399	400+
Pigs/sow/yr	19.1	21.8	22.1	22.1	22.3
Replacement rate (%)	31	40	49	46	53

(PIC, 1998)

IMPROVED PRODUCTION ?

sow performance

Herd size	Small (<250)	Medium (250-500)	Large (>500)
Born alive	9.3	10.0	10.2
No weaned	8.5	8.9	9.0
Sow mortality (%)	5.0	6.0	7.4

(USDA, 2001)

IMPROVED PRODUCTION ?

weaner/grower performance

Herd size	Small (<2,000)	Medium (2-10,000)	Large (>10,000)
<u>Mortality (%)</u>			
Weaner	2.5	2.6	3.0
Grower	2.4	3.0	3.7
Days to market	175.8	176.2	187.0

(USDA, 2001)

CHALLENGES

Increased risks

- Disease
 - more animal flow
 - more people
 - larger groups
 - limited sow immunity
- Vices
 - group size
 - environment



CHALLENGES

Health

	Small	Medium	Large
<u>% using antibiotic treatment</u>			
Sows	56	84	82
Grower	65	92	94

(USDA, 2001)

CHALLENGES

Health

	Small (<2,000)	Medium (2-10,000)	Large (>10,000)
<u>% with no clinical respiratory disease</u>			
Nursery	31	20	13
Grower	18	10	6

(USDA, 2001)

CHALLENGES

Health

Sow mortality	USA	Koketsu, 2000
	DK	Christensen et al., 1995
PRRS	DK	Mortensen et al, 2002
TGE	US	Yanga et al, 1995
Grower diseases	US	Tuovinen et al., 1997
Salmonella	DK	Carstensen & Christensen, 1988
Carcass condemnation	US	Tuovinen et al 1992



CHALLENGES

Vice

	Tail biting (N=55)	Control (N=37)	
<u>Herd size</u>			
sows	421	199	
growers	2973	1764	
No pigs /stockman	720	524	***



(Moinard et al., 2003)

CHALLENGES

- Environmental impact
 - odour
 - noise
 - manure disposal



CHALLENGES

Environment

- Nitrate Vulnerable Zones (Directive 91/676/EEC)
 - limits on N deposition/ha/annum
- IPPC (Directive 96/61/EC)
 - all units over 750 sows or 2000 finishing pig places
 - implementation of Best Available Techniques

CHALLENGES

Environment

	Small (<2,000)	Medium (2-10,000)	Large (>10,000)
<u>Odour complaints</u> (% herds)			
No complaints	99	95	87
≥2 complaints	0.4	2	3

(USDA, 2001)

CHALLENGES

- Staffing
 - recruitment
 - retention
 - motivation



- Family labour v employed labour

CHALLENGES

Labour

	≤500 sows	>500 sows
Job satisfaction (%)		
Very satisfied	65	48
Moderately satisfied	29	31
Dis-satisfied	6	21

(Segundo, 1989)

CHALLENGES

Labour

Source of dissatisfaction	% of stockpeople
Attitudes of other workers	24
Management style	24
The work itself	12
The physical environment	10

(English et al, 1992)

CHALLENGES

● Public image

- environmental impact
- animal welfare
- socio-economic impact
- food safety



Factors influencing food purchasing decisions

Factor	% of respondents rating as important
Family health	98
Taste	97
Conditions for animals	88
Environmental concerns	88
Price	82
Production method	62



FSA, 2001

Factors influencing food purchasing decisions

Factor	% of respondents rating as important	
	Prompted	Unprompted
Family health	98	12
Taste	97	18
Conditions for animals	88	1
Environmental concerns	88	2
Price	82	46
Production method	62	10

FSA, 2001

BALANCING CONSIDERATIONS



- Economy of scale
 - costs
 - logistics
- Risks
 - disease
 - staffing
 - environment
 - public perception

CONCLUSIONS

- Large-scale production gives advantages of economy of scale
- Good animal and human management is more critical
- Public image requires positive action

