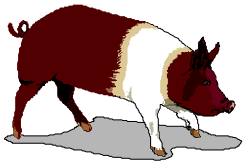
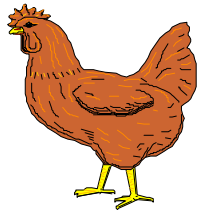




Consequences of 100% organic diets for pigs and poultry

Albert Sundrum

Outline

- Problems concerning 100% organic diets
- High protein feedstuffs in organic agriculture
- Possibilities to adapt to low availability of high protein feed
- Possible consequences for animal health and product quality
- Preliminary conclusions and recommendations

Problems concerning the implementation of 100% organic diets for pigs and poultry:

- Low concentration of limited amino acids (esp. methionine) in home-grown cereals and pulses
- Low availability and high price for organic cultivated feedstuffs for protein supplementation
- Increased production costs and at the same time restricted possibilities to compensate for by adequate premium prices

High protein feedstuffs for the use in organic agriculture

	Soya-bean meal	Soya-cake	Colza-cake	Sun-flower cake	Lin seed-cake	Skim milk-powd.	Whey powder less sugar
TM	880	880	910	910	900	960	960
g CP	451	424	334	431	337	350	229
g CL	12	68	79	107	89	4	12
MJ ME	13,0	14,4	12,3	14,0	11,4	15,2	13,4
g d Lys	**23,9**	23,0	12,6	8,7	9,7	25,1	15,5
g d M+C	**10,8**	10,3	10,1	10,3	9,01	10,9	7,4
g d Thr	**14,8**	14,2	9,5	9,2	9,2	13,8	12,1
g d Try	**5,1**	4,9	2,8	3,4	4,8	4,1	3,1

MJ ME = Mega Joule Metabolizable Energy, CP = Crude Protein, CL = Crude Fat, Lys = Lysin, M+C = Methionin + Cystin, Thr = Threonin, Try = Tryptophan, g d Lys = Gram digestible Lysin;
Reference: DLG-Pig 6. Edition (1991) , Degussa AminoDat 2.0 (2002), DLG-Amino acid table (1976)

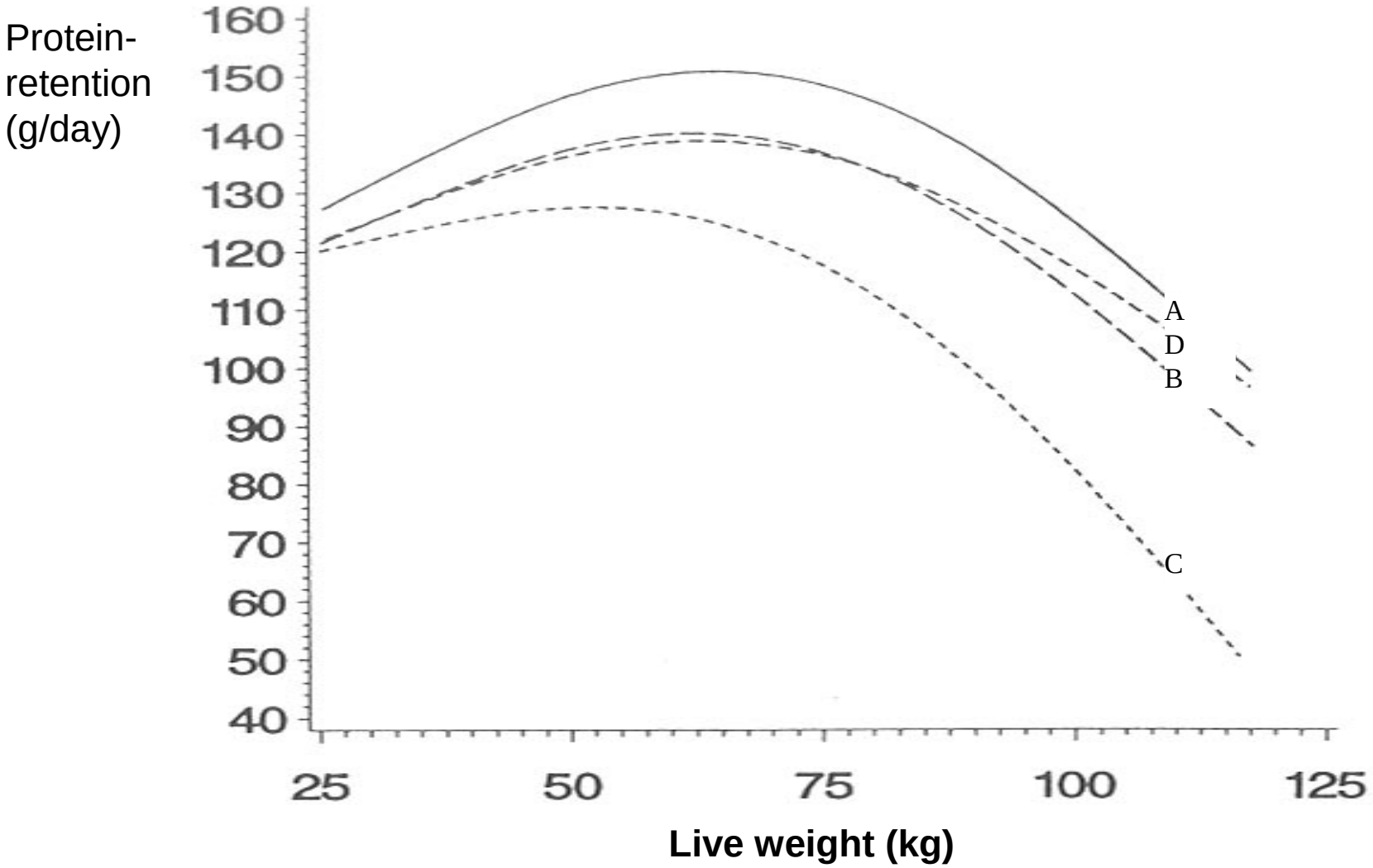
Demand of nutrient supply in the different stages of the development of fattening pigs

	Suckling period		Piglets		Growing period		Finishing period		Total fattening period	
	%	kg	%	kg	%	kg	%	kg	kg	%
Total	100	4	100	40	100	96	100	160	**300**	**100**
Cereals	56.5	2.26	56	22.4	57	54.7	66	105.6	**185**	**62**
Grain Legumes	10	0.4	12	4.8	36.5	35	29	46.4	**86.6**	**28.5**
High Protein Feed	30	1.2	29	11.6	3.5	3.4	2	3.2	**19.4**	**6.5**

Feed íntake

Need for high protein feed is primarily restricted to the starting period. Multiple phase feeding is an appropriate measure to reduce the need for high protein feed in the total diet within the growth period.

Protein retention capacity of fattening pigs in relation to genotypes for high (A), medium (D, B) and average (C) muscle growth (Palmer et al., 1993)



Genotypes for high muscle growth have a clear higher demand for high protein diets than genotypes with a moderate growth capacity.

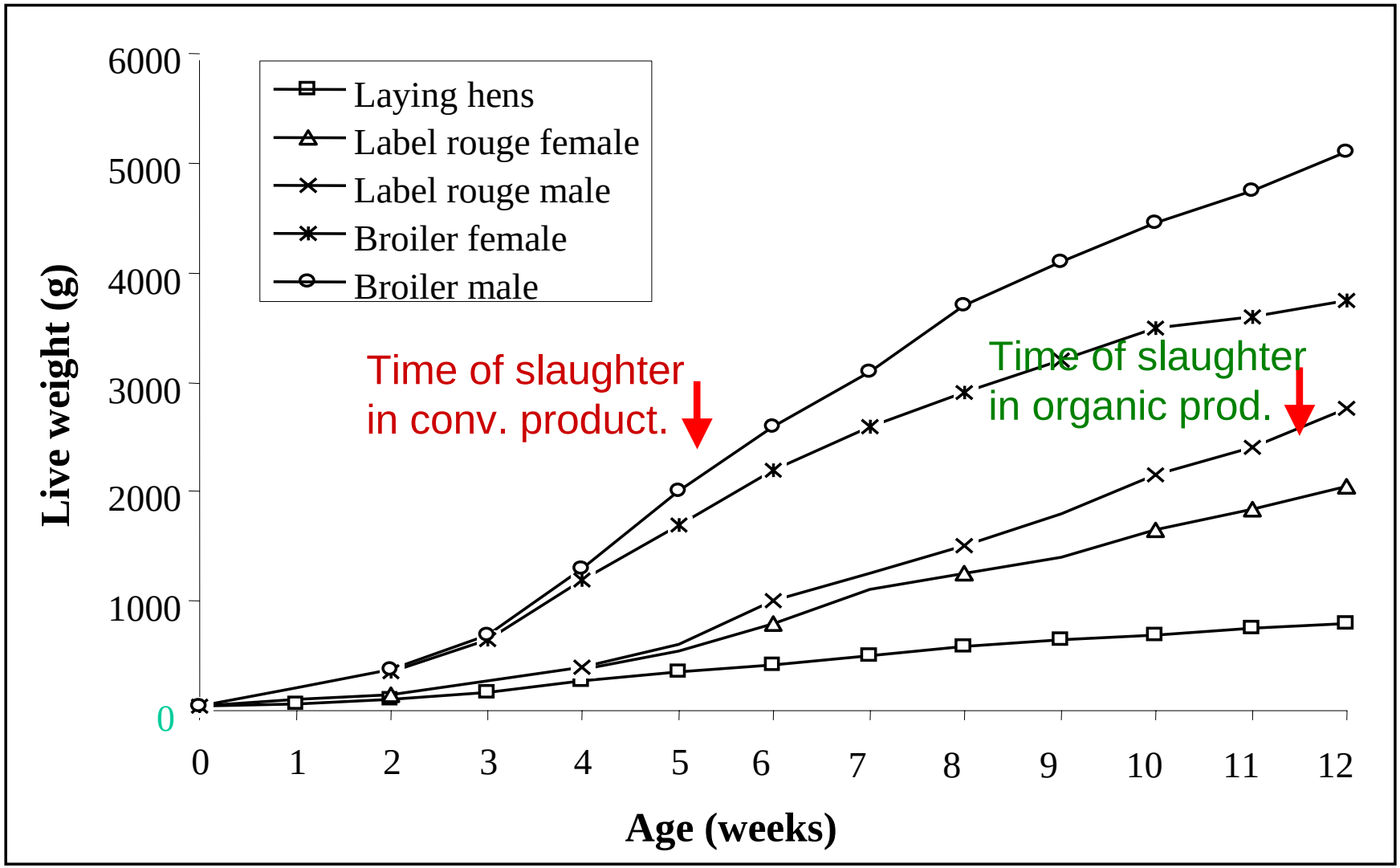
Relevance of protein retention for production traits in fattening pigs (Susenbeth, 2002)

Protein-retention (g/d)	**Fat-retention (g/d)**	**Weight gain (g/d)**	**Feed conversion (kg/kg)**	**Muscle-growth (g/d)**
130	**250**	**840**	**2,61**	**330**
150	**240**	**920**	**2,39**	**380**

Body weight: 60 kg — Feed intake: 2,20 kg/d: 13,0 MJ ME/kg
ME_m = 0,475 MJ/kg $BW^{0,75}$ — kpf = 0,70
22 % XP in dFFS — 56 % of total body protein in the muscle
1 g CP correspond to 2,55 g muscle growth

Already a small difference in protein retention has a clear effect on live weight gain, feed conversion and muscle growth while the efficiency in the use of amino acids does not differ between genotypes different in lean growth and feed conversion.

Live weight development of laying hens, male and female table birds and Label rouge birds (EU-Report, 2000)

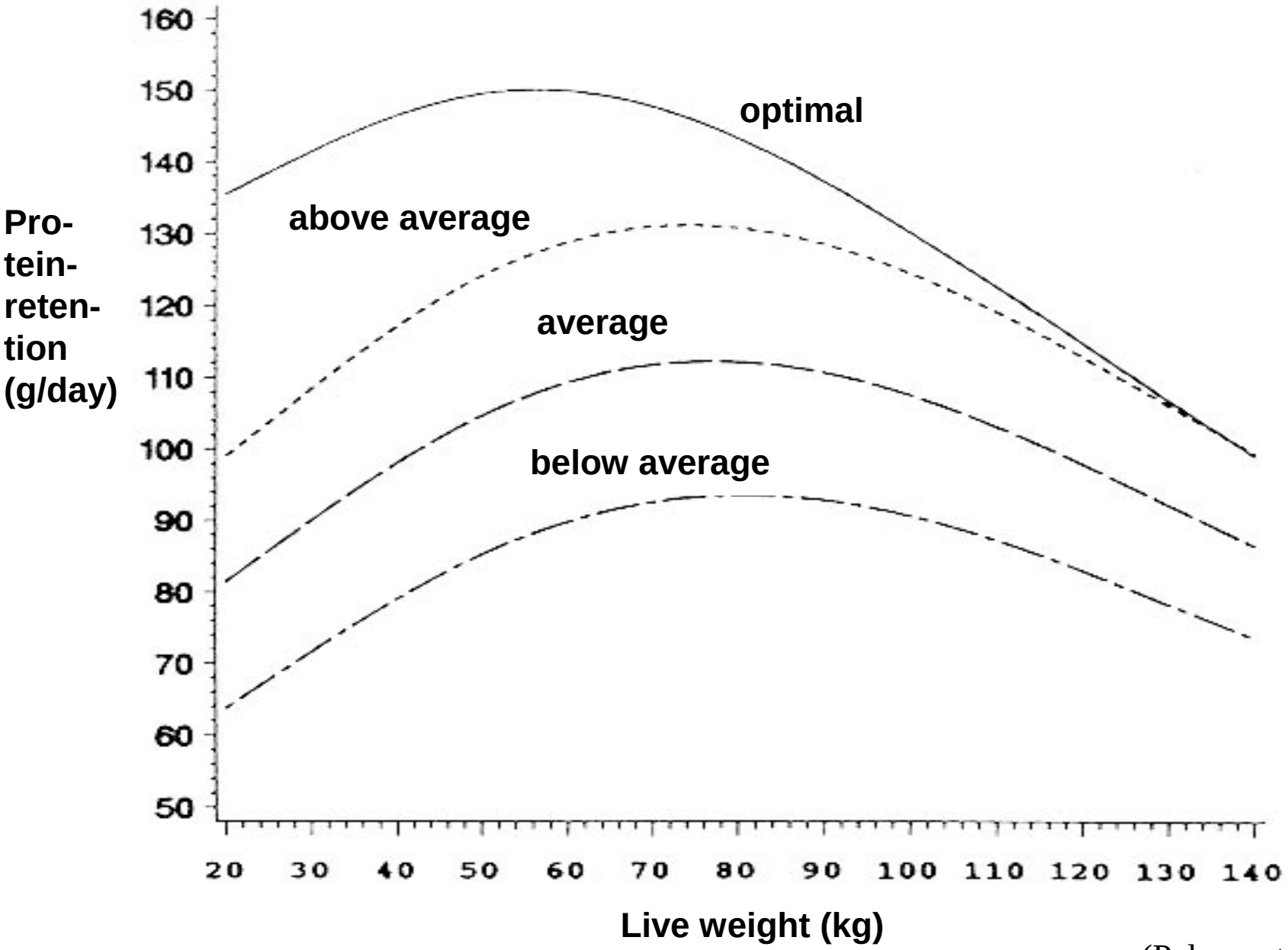


The requirements of amino acids is closely related to growth intensity which is clearly reduced in slow growing strains compared to conventional strains.

Possibilities to adapt to the restricted availability of high protein feedstuffs by:

- ✓ multiple phase feeding to adapt the nutrient supply closely to the requirements in the different growing stages,
- ✓ use of slow growing strains with a reduced growth performance, and a reduced demand in the nutrient supply,
- ✓ use of diets with a comparable high portion of pulses to increase crude protein and therewith the supply of limited AA,
- ✓ restricting the energy content in the diet and therewith increase feed intake or generate compensatory growth effects,
- ✓ optimising housing and feeding conditions and therewith increase feed intake and decrease protein requirements for an increased immune defence due to a high germ pressure.

Protein retention in pigs of the same genetic growth capacity (high), fed the same diet under optimal experimental and under farm conditions



(Palmer et al., 1993)

Consequences of imbalanced rations for animal health and product quality:

- Restrictions in the availability of limited amino acids can to a high degree be compensated for by the selection of appropriate breeds, by an increased feed intake and by compensatory growth effects without causing health problem or deficits in quality.
- Investigations showed that genotypes with a high capacity for muscle growth are more sensitive to an imbalance in the supply of amino acids than traditional types resulting among others in a lower feed intake and a higher susceptibility for health problems.
- A lower growing intensity provides possibilities for a higher sensorial quality of the meat and '*avoid specific diseases or health problems associated with some breeds or strains used in intensive production*'.

Differences in the priorities between conventional and organic meat production systems

Conventional	Organic
Minimizing production costs	System-oriented production, based on land use and use of organic feedstuffs
Maximising productivity of farm animals	Maximising efficiency within the whole farm system
Maximizing carcass yield	Optimising product and process quality (animal health and welfare, environ. friendly)
Optimising single quality traits	Reducing production costs

Conventional and organic livestock production are part of completely different farm systems with different objectives and different priorities. Therefore, single production traits and feeding strategies are not directly comparable and compatible.

Preliminary conclusions

- Limited amino acids are the bottle neck with regard to growth performance in pig and poultry production.
- Genotypes for high muscle growth have a clear higher demand for high protein diets than genotypes with a moderate growth capacity.
- Recent investigations show that, in principle, requirements of limited amino acids in pig and poultry production can be met by organically grown high protein feedstuffs.
- Selection of appropriate breeds, and providing good living and feeding conditions are suited to compensate for deficits in protein supply by increased feed intake and compensatory growth effects.
- A lower growing intensity provides the chance of a higher sensorial quality of meat and possibilities for an improved animal health status.

Preliminary recommendations

- Allowances for non-organic bought-in-feedstuffs should be banned or at least the portion clearly decreased (except for minerals, trace elements, and vitamins) to provide the possibility for a clear distinction between organic and conventional production.
- There is need for redefining the term ‘slow growing strains‘. Instead of demanding only a minimum age at slaughter, growing intensity should also be taken into account.