

Making Pork from Feed

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■ Introduction

The pork category continues to expand worldwide. Many inputs influence the business of pork, but certainly feed or nutrients have a large influence. A sharper focus on nutrients is required for today's producers making pork.

Nutrients provide a cornerstone in supporting efficient pork production. Proven processes are critical to match nutrient demands of pigs with nutrient supplies from ingredients. Overall pork output kept pace with total meat growth of 18% from 1998 to 2005 – growing 16% respectively in metric tons. Pork consumption per capita remained strong at 15.6 kg in 2003 – second only to seafood consumption at 16.1 kg. The pork supply is largely produced in twenty countries. Cost of production was estimated at \$ 1.18 per kg across 13 countries in 2006.

This address highlights the global pork category, along with insight on using a nutrient-based approach to pork production, especially as the world evolves the value measures.

■ Category

Pork kept pace with the overall meat growth of 18% from 1998 to 2005 – growing 2.2% annually in metric tons. Poultry meat output increased 30% over the seven years, while beef production lagged at 9% for the period. Pork is the 2nd largest category behind seafood, ranked on per capita 2003 consumption (e.g. 15.6 vs. 16.1 kg), followed by poultry and beef. More pigs and larger carcasses led to the 102.523 million metric tons of pork in 2005. Over 80% of the world's pork is produced in 12 countries – led by China, the USA and Germany (**Table 1**). China exerts a large influence on the pork category, which at times can mask basic understanding of the global category.

Table 1. Leading Countries in Pork Production (ranked on 2005 pig meat)

Location	World Rank	2005 Sow Inventory, 1,000 hd	2005 Pig Slaughter 1,000hd	2005 Pigmeat, 1,000 MT	1998 to 2005 Pigmeat Change 1,000 MT	Ann%
Asia			788,927	58,439	+ 11,648	3.5%
China	1	42,200	651,654	50,095	10,194	3.3%
Vietnam	7	3,382	36,253	2,288	1,060	9.0%
Japan	14	925	16,300	1,250	-41	-0.4%
Philippines	15	2,110	19,200	1,100	167	2.4%
Korea, Rep.	18	975	14,000	1,050	111	3.0%
Taiwan	19	812	10,140	920	28	0.4%
Americas			202,992	17,123	+ 2,446	2.2%
USA	2	6,060	104,000	9,402	779	1.2%
Brazil	5	3,020	38,400	3,110	710	3.7%
Canada	8	1,643	23,150	1,960	568	5.0%
Mexico	17	940	13,867	1,058	98	1.4%
Europe			291,383	25,627	-159	-0.1%
Germany	3	2,504	47,000	4,505	671	2.3%
Spain	4	2,593	39,596	3,310	566	2.7%
France	6	1,284	24,885	2,257	-71	-0.4%
Poland	9	1,808	22,230	1,923	-103	-0.7%
Denmark	10	1,340	22,900	1,800	171	1.4%
Russian Fed.	11	1,800	19,800	1,610	105	1.0%
Italy	12	722	13,247	1,550	138	1.3%
Netherlands	13	1,100	14,341	1,299	-426	-4.0%
Belgium	16	584	11,677	1,100	27	0.3%
United Kingdom	20	505	9,103	704	-431	-6.6%
Africa			16,399	809	+ 124	2.4%
Nigeria	37	NA	4,627	208	64	5.4%
South Africa	46	NA	1,862	140	21	2.3%
World			1,307,929	102,523	+ 14,090	2.2%

Source: FAO, 2006, EuroStat 2005, Cargill 2006, USDA-FAS GAIN Reports

Excluding China, the pork category grew at only 1.1% per year with 20 countries then producing over 80% of the global pork. This closer look is important, because the global pork production is projected to grow at 1.2% annually from 2001 to 2030, slowing to 0.4% per year from 2020 to 2050. The commodity pork sector will remain important to the overall category. Branded pork products will strengthen in importance as population growth slows from 6.1 billion people worldwide in 2000, reaching a plateau of 9 billion people between 2050 and 2075.

China, Vietnam, the United States, Brazil and Germany reported the largest pork meat increases from 1998 to 2005. In contrast, the United Kingdom, Netherlands, Poland, France and Japan marked the largest declines during the same period. The separate ranking of the European Union (EU) member countries, even though the EU is the 2nd largest marketplace, is due in part to their fragmented trade, policy and local actions. Recent EU requirements of pork production and processing have challenged new members in the short-term with capital and expertise resources. Notable losses in pig meat (metric tons) have occurred in Romania, Ukraine and the Czech Republic.

New countries are emerging on the global scene fueled by socioeconomic influences, know-how access, trade policy and demanding consumers. These changes require our understanding of nutrients, pig metabolism and customer value to be refined for developing countries located in the southern hemisphere. The pork business has evolved from international to global, from long-distance transactions to neighborly collaboration and from commodity to unique value.

Global pork consumption strengthened to 15.6 kg per capita in 2003 (**Figure 1**). European consumers topped the list by consuming 35.2 kg pork in 2003, followed by North American, Asian and Latin American consumers with 29.8, 14.7 and 9.9 kg per capita, respectively. Austria, Spain and Denmark led all countries in pork consumption with 74.4, 66.5 and 63.3 kg per capita, respectively. Future growth in pork consumption is expected, due in part to consumer income levels, lifestyle, local culture, consumer confidence and government policy. These factors influence consumer preference of pork products, such as commodity vs branded pork, along with the preferred distribution channels. Markets continue to evolve. Pork production must support this evolution through new mindsets and value measures.

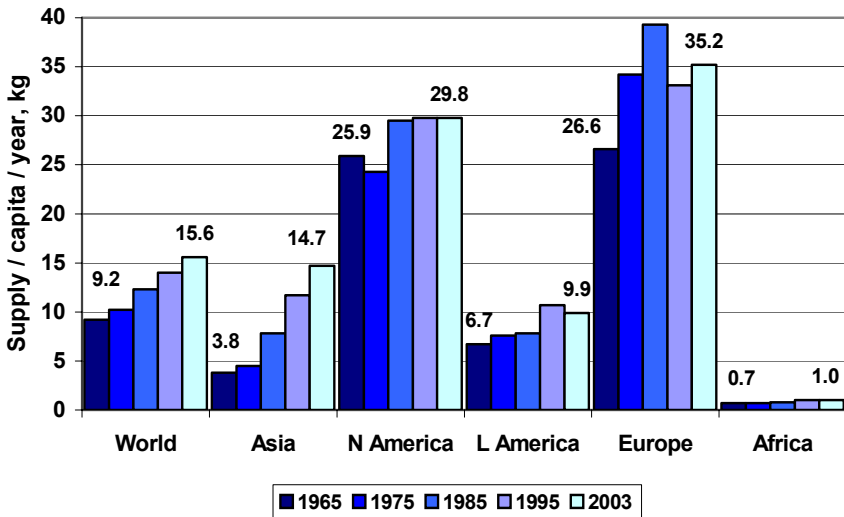


Figure 1. Pig meat per capita supply per year from 1965 to 2003 (FAO).

■ Nutrients

Efficient pork production depends upon a rich nutrient vocabulary. Traditionally, locally grown grains were mixed and fed to pigs by land-based pork producers so as to create and capture more value. Today, the focus has shifted from feed to nutrients, from swine to pork and from cost to value. The key lies in aligning the nutrient demands of the pig's metabolism to the nutrient supplies from ingredients, so as to create more customer value for today's measures of pork production.

The business of pork production requires the practical application of nutritional principles. This begins with a nutrient vocabulary. A robust nutrient vocabulary (i.e. net energy, Ideal Carbohydrate™ balance, digestible amino acids etc) provides much opportunity and advantage. A disciplined approach is required to refine, add and delete nutrient definitions parallel to the use of a language so as to support efficient pork production. A proven nutrient vocabulary helps producers manage expectations in pig performance, ingredient purchasing, financial value and pork products, to name a few. This approach moves the discussion to a nutrient-based production rather than discussing the traditional minimum or maximum ingredient inclusions. When few ingredients are available, a producer must use a limited or abbreviated

nutrient vocabulary in their language to produce pork. This provides a barrier to efficient pork production.

New nutrient principles provide a competitive advantage. For example, sow diets generally do not have nutrient specifications for dietary carbohydrates, although these nutrients account for over 60% of the diet. Published literature report several ingredients linked to improve sow productivity but not specific carbohydrate nutrient levels. This makes it difficult for producers to identify or substitute ingredients for buying decisions, unless a robust nutrient vocabulary such as the Ideal Carbohydrate™ balance is used. Our first use of this concept was in 1997. The new nutrient approach created distinctive value in identifying preferred ingredient sources and defined nutrient levels that supported sow productivity and deepened confidence of live production managers (**Table 2**).

Table 2. Nutrients used to support sow productivity (2004 USA, North Carolina).

Location	Control	Ideal Carbohydrate™ balance
Number of Sows	3,203	5,773
Pigs / Mated Sow / Year	20.7	22.9
Feed Consumed		
Gestation, kg	2.2	2.5
Lactation, kg	4.8	5.4

Another example is considering ingredients such as distillers grains from the biofuels industry. Although distiller grains have been used for many years, new equipment and processes have changed the traditional nutrient supplies. The biofuels industry will have a profound influence on production agriculture from marketing grain to using land to producing pork or enriching communities. Today in the USA, one metric ton of corn used for ethanol production will produce on the average 330 kg of distillers grains. In turn, this ingredient provides a rich nutrient supply for pig diets by replacing traditional feed grains and meal, along with conserving diet cost if used properly. Ingredients like these and others require a rich nutrient vocabulary to be used, so that feed intake, pig performance and pork quality are not compromised.

Processors interested to differentiate their branded pork products have become more interested in using dietary nutrition to change pork quality. A growing area of interest is the fat firmness or softness in pork products. Nutrient levels supplied through diet formulation provide an effective method

to consistently manage these expectations. Our customers in markets such as Switzerland, Japan and USA desire a very firm fat in their pork products that fits with their preferred eating experience. Likewise, customers that purchase pork through 'wet' markets, such as Vietnam and others, demand a very soft fat as they associate this with pork freshness. A striking difference in customer requirements requires us to deeply understand nutrients so as to deliver consistent customer value. Other examples of pork quality requirements are available which reinforce the importance to understand the nutrient demand, nutrient supply and nutrient efficiency of pigs.

■ Nutrient Processes

Defined processes separate production firms on their effectiveness. Clear processes allow a firm to execute a task, remove personal preferences and sustain an advantage. This is especially critical as managers must make better, faster and more valued decisions on a routine basis. Take for instance the expected decisions of how ingredients are valued or what diet designs are fed or how much feed is fed per pig. What proven tools can be easily used to support routine decisions in producing pork?

Nutrient variability is inherent to ingredients, suppliers and diets. A disciplined process to measure, matrix, formulate and manufacture nutrients leads to a notable advantage, especially when nontraditional opportunities surface. Our system of nutrient supply connects several processes from ingredient suppliers to delivered feed. These proven processes help support routine tasks and decisions by pork producers to achieve the desired value standards.

Take for example, the task of feeding pigs. What processes are currently used by a business to ensure the 'right nutrients get to the right pigs at the right time'? Many steps are required everyday to fulfill this task successfully in delivering nutrients. The process begins with defining the pig's nutrient demand (i.e. metabolism, intake, environment, health, etc) relative to the expected customer value. Next, what feed budget is needed, available bins, required truck logistics, mixing controls, diet specifications, available ingredients and approved suppliers, to name a few. Each step leads to a successful nutrient delivery for the pig or rather a business gap or 'wobble', depending upon the system's precision and accuracy. Today's pork production standards continue to become more demanding and precise.

■ Nutrient Efficiency

Another cornerstone of pork production is pig productivity. Low cost production depends upon rigorous production standards of sow productivity,

pig growth efficiency and herd livability. Nutrient efficiency is defined as feed/gain or nutrient/gain for growing pigs.

Production data received from Agrimetrix[®] Associates Monitoring Service provides interesting insight into the nutrient efficiency of progressive USA pork producers. **Figures 2 and 3** graph the past 12 years of nutrient efficiency from wean-finish growing pigs (6 to 119 kg).

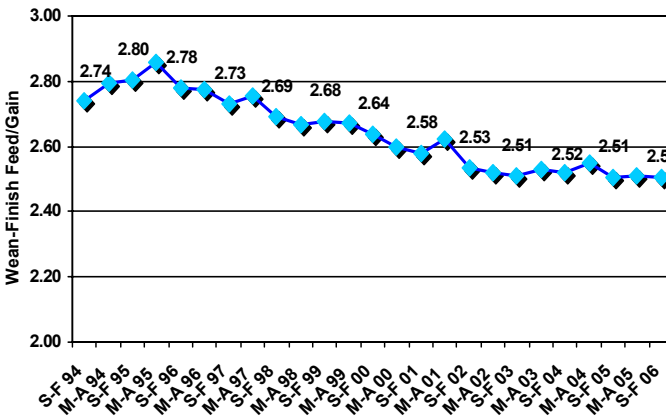


Figure 2. Feed efficiency of wean-finish growing pigs in USA from 1994 to 2006 (used with permission from Agrimetrix[®] Associates Monitoring Service).

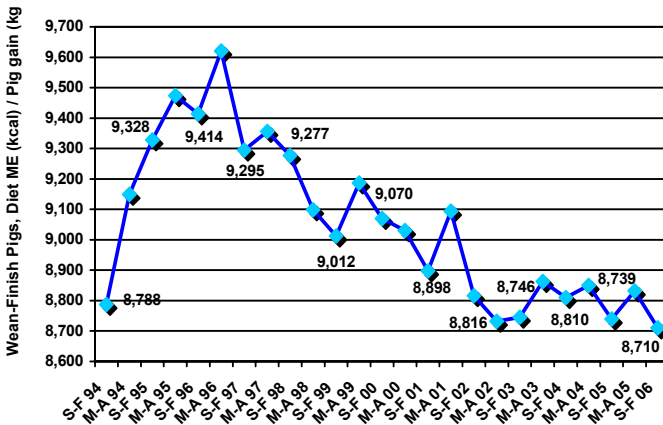


Figure 3. Nutrient efficiency of wean-finish growing pigs in USA from 1994 to 2006 (used with permission from Agrimetrix[®] Associates Monitoring Service)

Although much progress has been made, the past four years have been stable at about 2.51 feed/gain or 8,760 Diet ME (kcal) per pig gain (kg). What are the next nutrition breakthroughs to further improve nutrient efficiency? Several areas may hold promise, including improving pig comfort, reducing maintenance nutrient demands and refining carbohydrate nutrition principles. New discoveries and approaches in these areas may take us to a new standard of excellence.

Much variation exists within and across countries in producing pork, regardless of market structure. Leading pork producing countries were surveyed to determine the cost of production from local contacts and production data in early 2006. Based upon this work, the cost of production averaged \$ 1.18 per kg (USA \$ per kg live weight) across the 13 leading pork production countries, using the currency exchange at that time (**Figure 4**). Cost control remains a key measure to long-term competitiveness, although continued focus on creating value through unique pork products is growing.

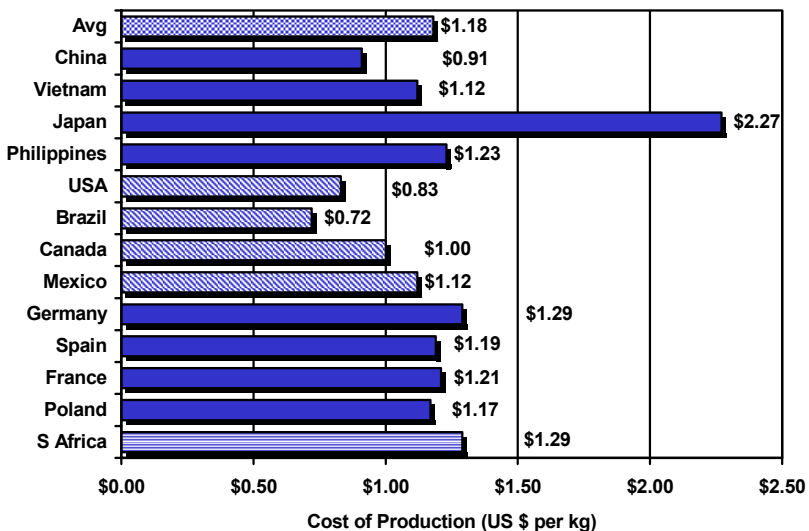


Figure 4. Live production cost per kg surveyed in leading pork production countries (personal communication with Cargill® and PIC® staff, 2006)

New standards have been placed on production firms in the interest to differentiate the pork produced. These requirements spread across various groups, including government (e.g. environmental regulations), food retailers (e.g. genetic line, animal welfare, traceability etc), influencers (e.g. social responsibility, Hazard Analysis and Critical Control Points, etc) and consumers (e.g. natural foods, etc). The key is to ensure these requirements

align to deliver long-term customer value, so that a region's competitiveness remains viable to produce pork.

■ Customer Value

Production of pigs has been refined over many years. Traditional supply-side production models are being adjusted to address emerging demand-side requirements. Tomorrow's standard will involve specialized streams of pigs produced to demanding customer requirements with limited variation. This contrasts the traditional commodity pork of the past. With this change, effective marketing and branding will become even more important to the business.

This transition occurred with poultry meat. Poultry products have evolved from commodity whole birds to unique products marketed to support the consumer's lifestyle, convenience, taste attributes, packaging preference, price point, social attitude and fun elements. Production capabilities are aligned to support the consumer's value requirements. Many papers and case studies have highlighted this transition. Today, pig meat is marketed under many brands throughout the world. Which brands are most valued in a sector or country depends on the consumer's relationship. Brands provide an indelible mark of quality that provides choice for consumers. In simple terms, a brand represents promises made and kept over a long period of time to support a trusted and respected relationship with the consumer. And when the consumer experiences this promise, the relationship prospers – just like any relationship. Unique valued brands are an opportunity for long-term strategic advantage.

The business of pork depends upon keen inputs. One such input, nutrients, remains central to efficient pork production. New discoveries and new applications will continue to deepen our understanding of nutrient demands, nutrient supplies and nutrient efficiency of the pig. These are exciting times for courageous and visionary leaders as they consider tomorrow's pork production.

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