



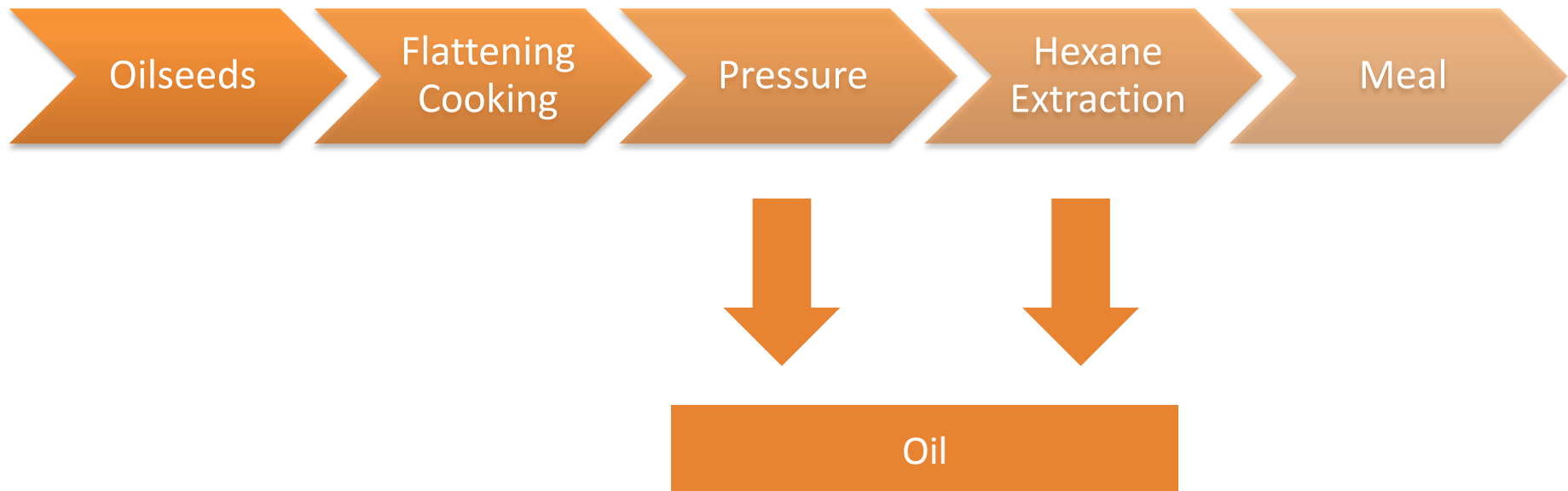
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Dehulling and its impact on feed and meal quality and prices

BENOIT JIMENEZ, OFI TURKEY 2014

Meals are produced through the crushing of oilseeds. After a preparation step, oil is extracted thanks to a pressure step and a hexane extraction step to produce meal rich in protein.

Oilseeds Crushing Process



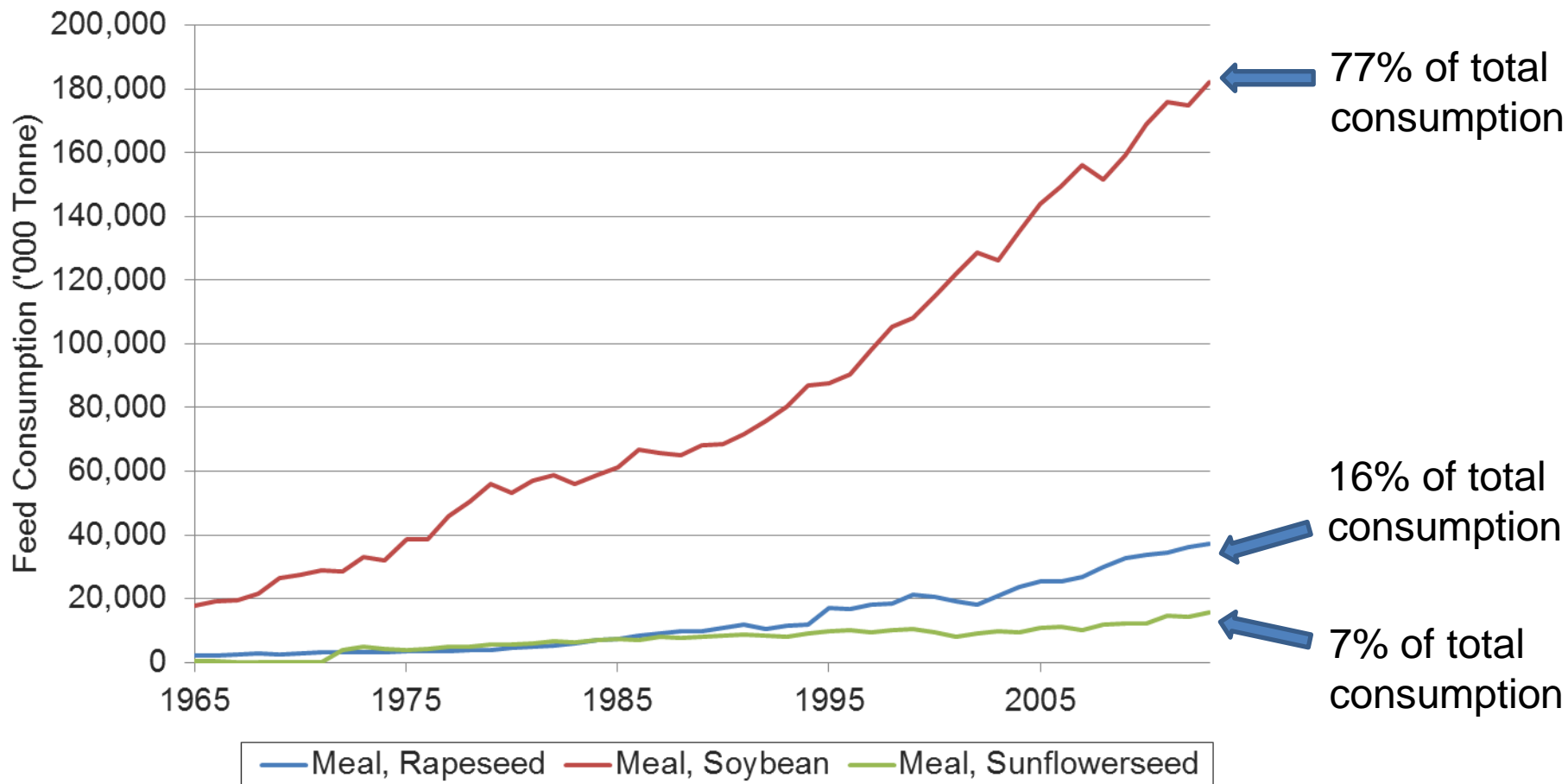
Soybean meal provides proteins both in quality and quantity whereas rapeseed meal contains non nutritional factors and sunflower meal has the lowest proteins in quantity and an high fiber content.

Comparative table of different protein meals

	Soybean	Rapeseed	Sunflower
Quality of Proteins	High	Good	Medium (Lysine deficient)
Quantity of Proteins	High – 48%	Good – 34%	Medium – 29%
Antinutritional factor	n/a	Sinapines, Erucic Acids, glucosinolates, tannins ...	n/a

Representing 77% of total meal consumption, soybean meal is the major vegetable protein source in the world. While, sunflower and rapeseed meal are less used.

World consumption of meal in animal feed



Dehulling is then a good way to solve the problem of protein content in meal. Several technologies are available to dehull sunflower seed.

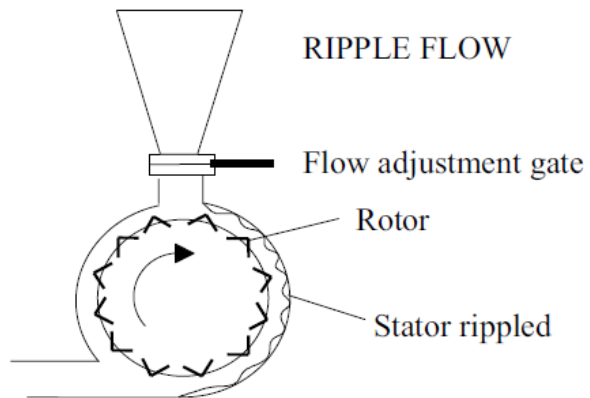
Vertical Mono-Chock Impact Dehuller



Horizontal Mono-Chock Impact Dehuller



Multi-Chocks Impact Dehuller (Ripple Mill)



Separator

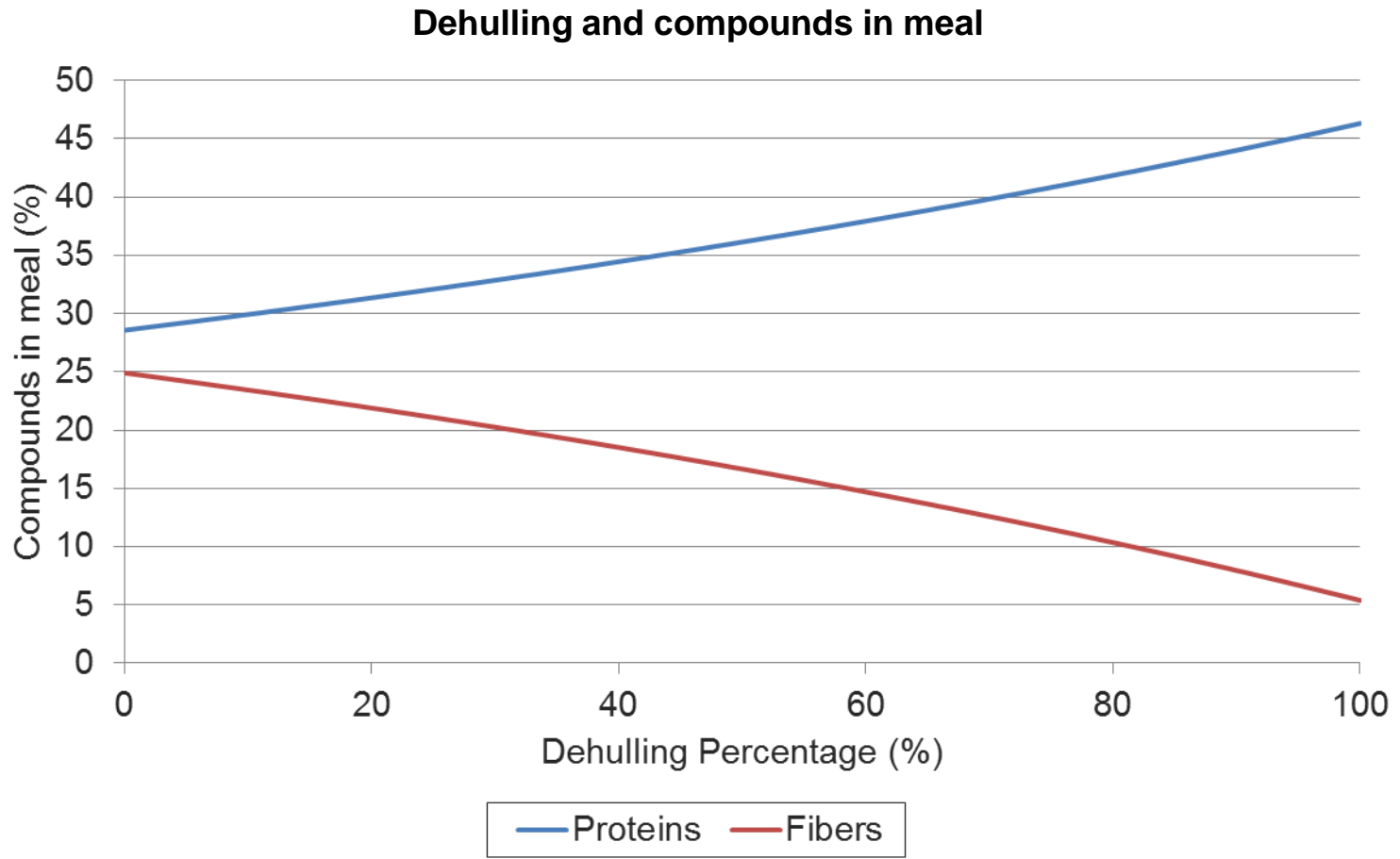


Dehulled sunflower provides 20.7% higher content of proteins and 21.9% lower content of fibers than conventional meal, hence reinforcing nutritional values.

Composition of sunflower seeds, kernel and hulls

Sunflower	Seeds	Pure Kernels	Pure Hulls	Conventional Meal	100% Dehulled Meal
Dry Matter (%)	92.8	90.5		88.8	90.5
Oil (%/DM)	48	61.25	2.5	2.2	1.2
Proteins (%/DM)	16.7	20.6	6.2	31.9	52.6
Crude fibers (%/DM)	17.3	2.4	57.6	28.1	6.2
Ashes (%/DM)	3.5	3.6	3.2	7.05	9.24

The common dehulled sunflower meal from Black Sea has 36% of protein corresponding to 50% of seed dehulling. The soybean meal protein content cannot be reached.



Nutritional values of Black Sea sunflower meal approach soybean meal's. This allows a largest use in animal nutrition.

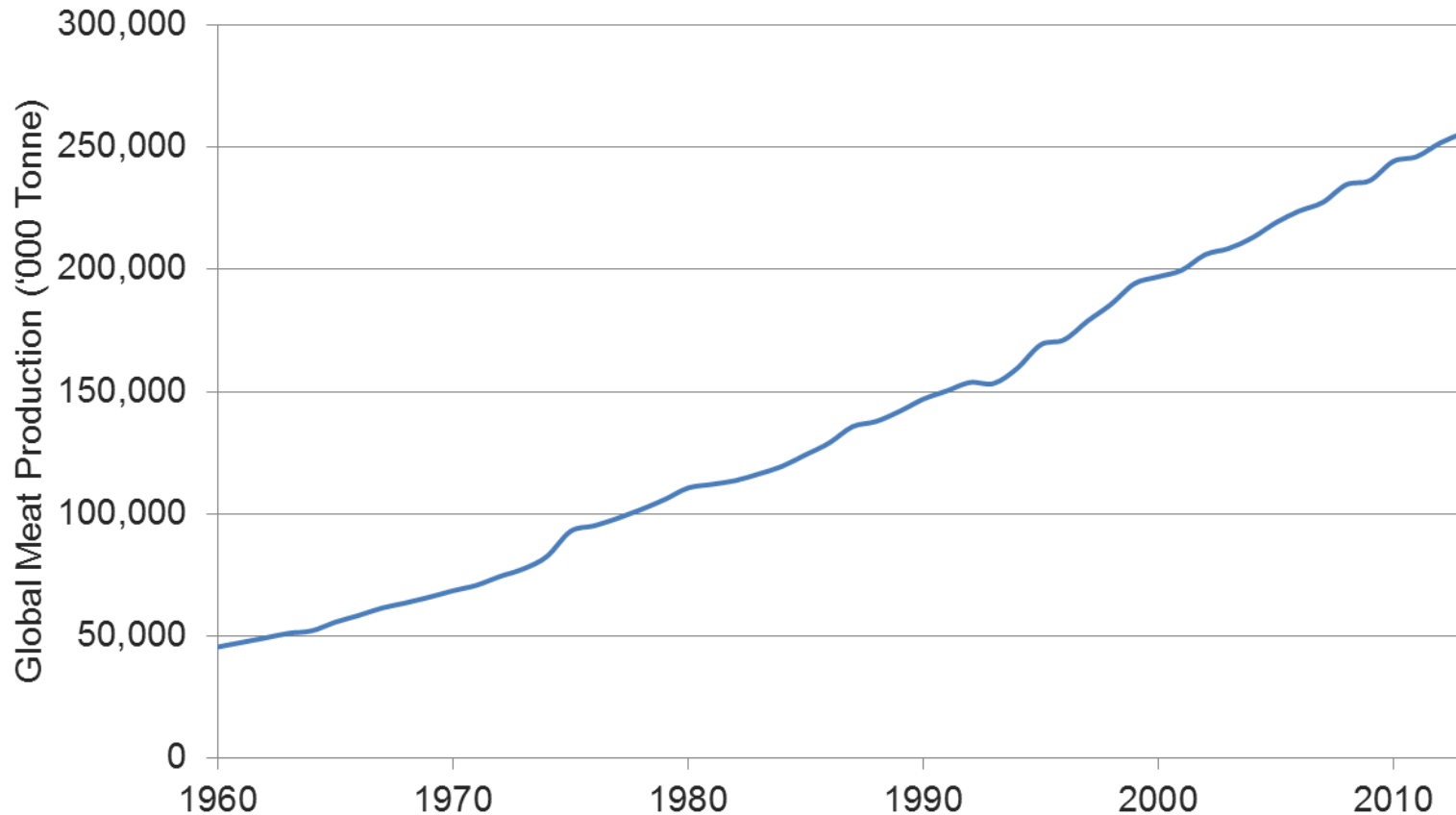
Nutritional Values by species and by meal

Estimated Nutritional Value	Sunflower seed	Conventional Sunflower Meal	Black Sea Sunflower Meal	SOYA "48"
Poultry				
Metabolisable Energy (kcal /kg)	4370	1350	1830	2280
Swine				
Digestible Energy (kcal/kg)	4520	2140	3278	3520
Ruminant				
UFL/kg/DM	1,44	0,56	0,89	1,06
UFV/kg/DM	1,39	0,46	0,83	1,05
PDIE (g/kg)	33	93	119	229
PDIN (g/kg)	97	178	242	331

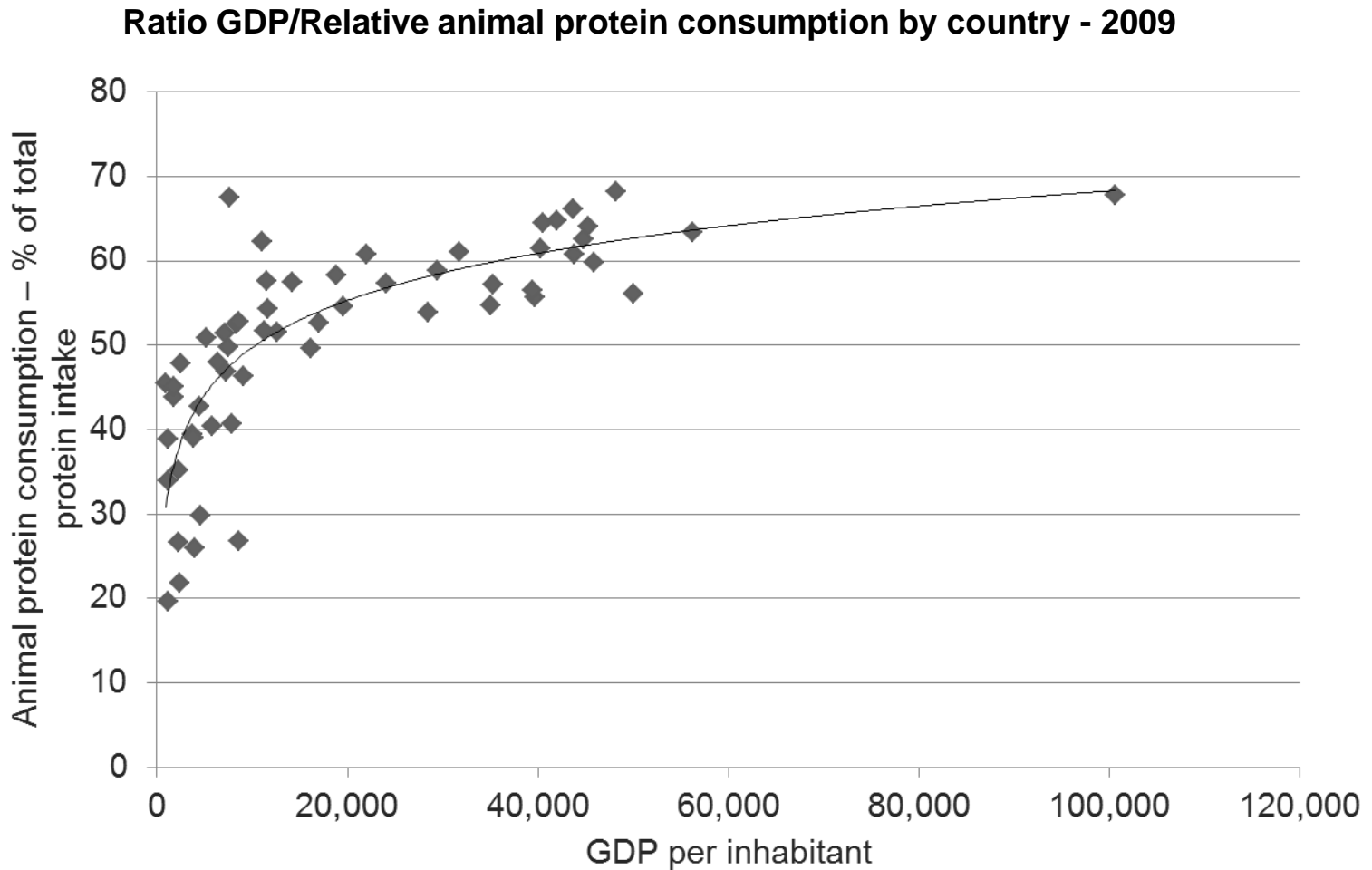
What are potential markets ?

There is an increase by 3.3% per year in the global meat production where dehulled sunflower meal is mainly used.

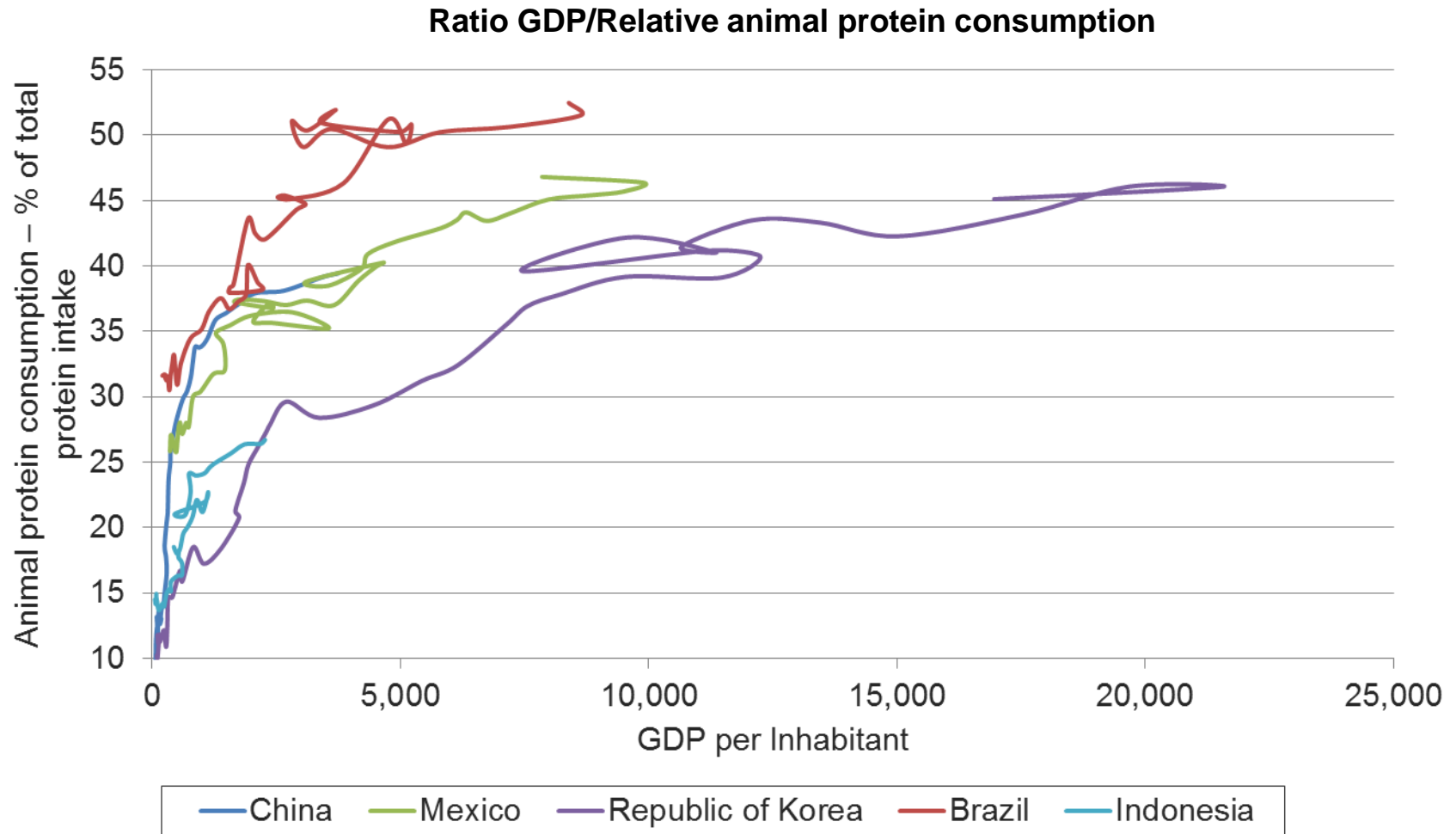
Global Meat Production , 1960 – 2013 ('000 tonne)



The correlation between GDP per inhabitant and relative animal protein consumption shows that the increase of the income induce an increase of relative animal protein consumption.

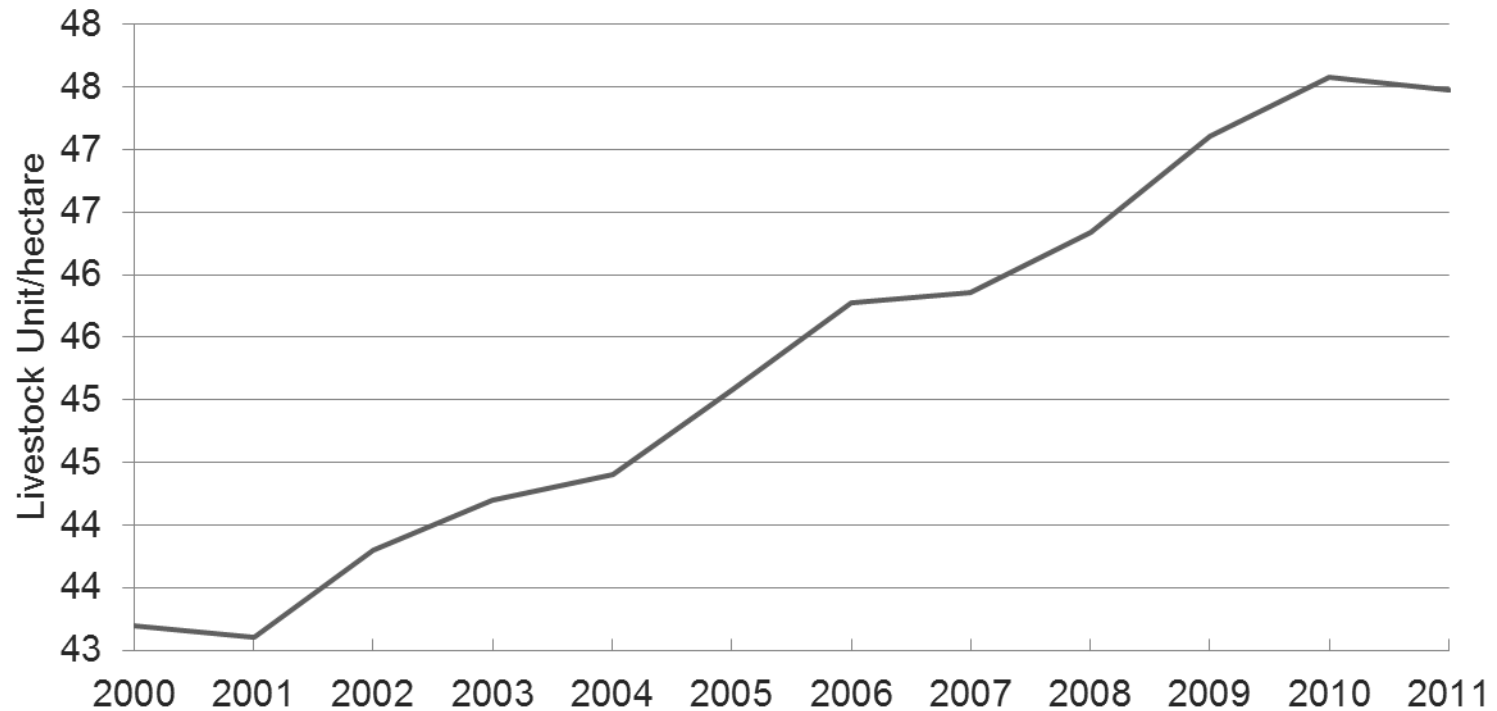


New industrialized Countries follow the same developing way which underlie the consumption of compound rich in protein for animal nutrition.



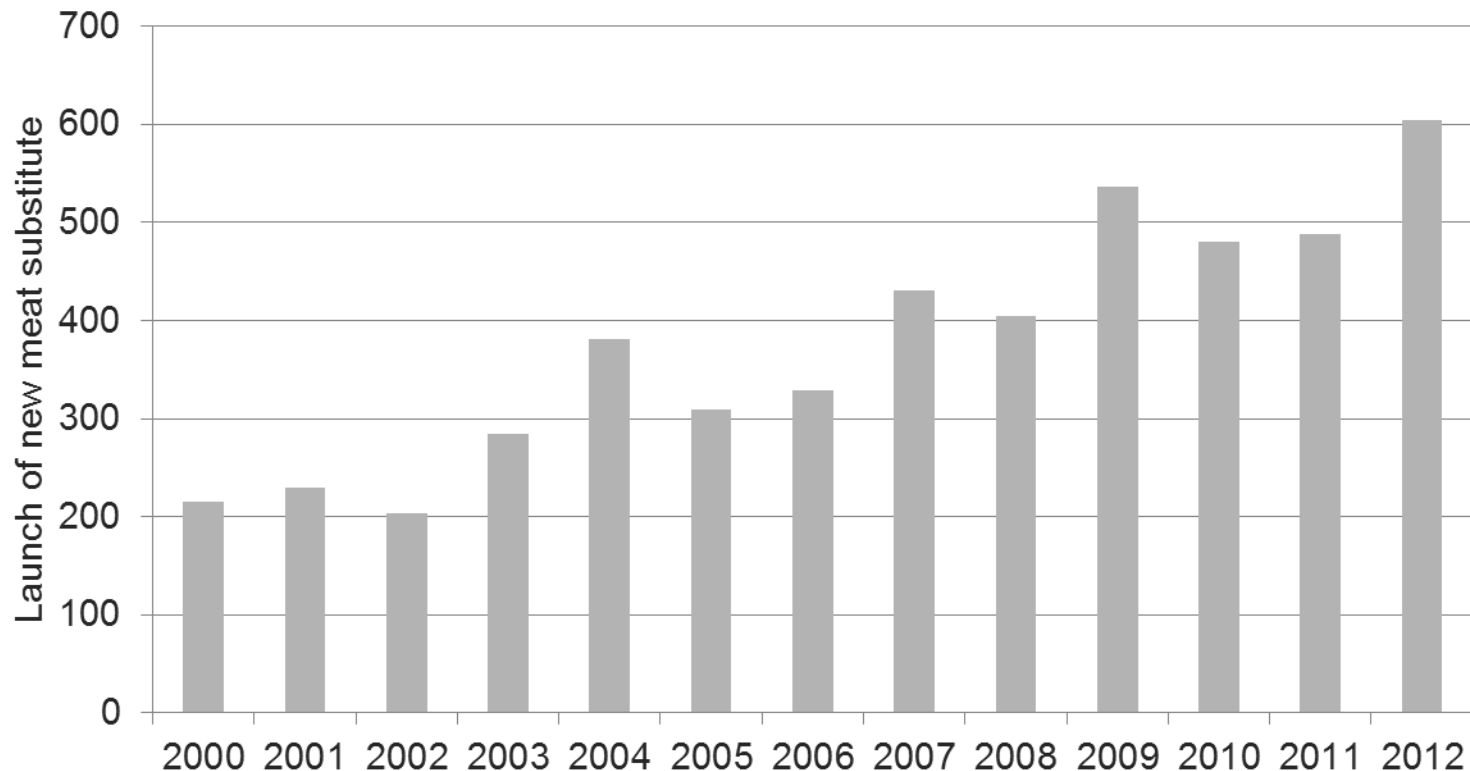
Livestock density, which represents the intensification of livestock farming, increased by 0,86% per annum from 2000 to 2011. The use of compound rich in protein becomes a necessity.

Evolution of global livestock density (2000-2011)

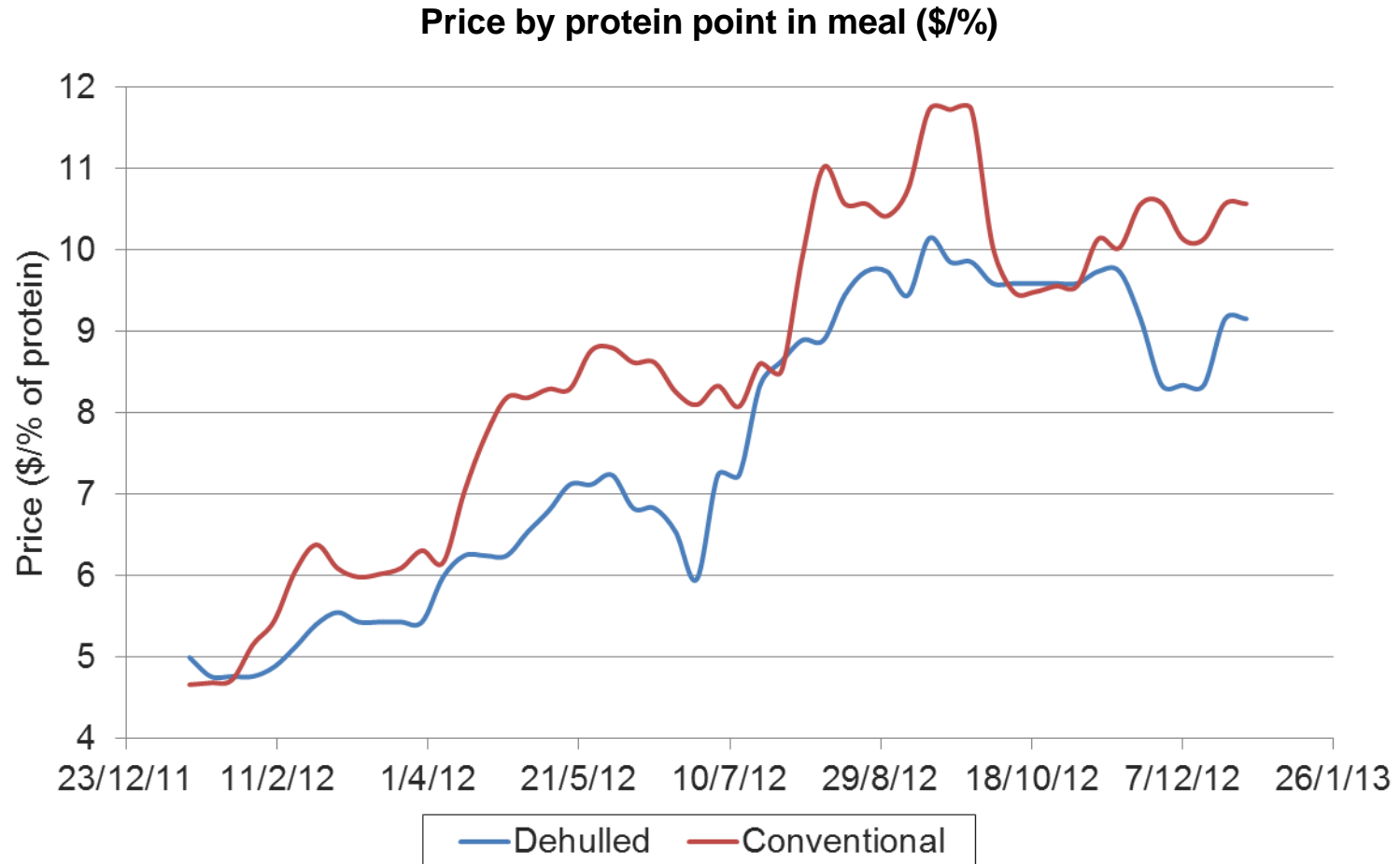


Meat substitutes are used on markets which offer « naturalness », « health » and « vegetarianism » claims. These markets will support the use of dehulled sunflower meals for human nutrition.

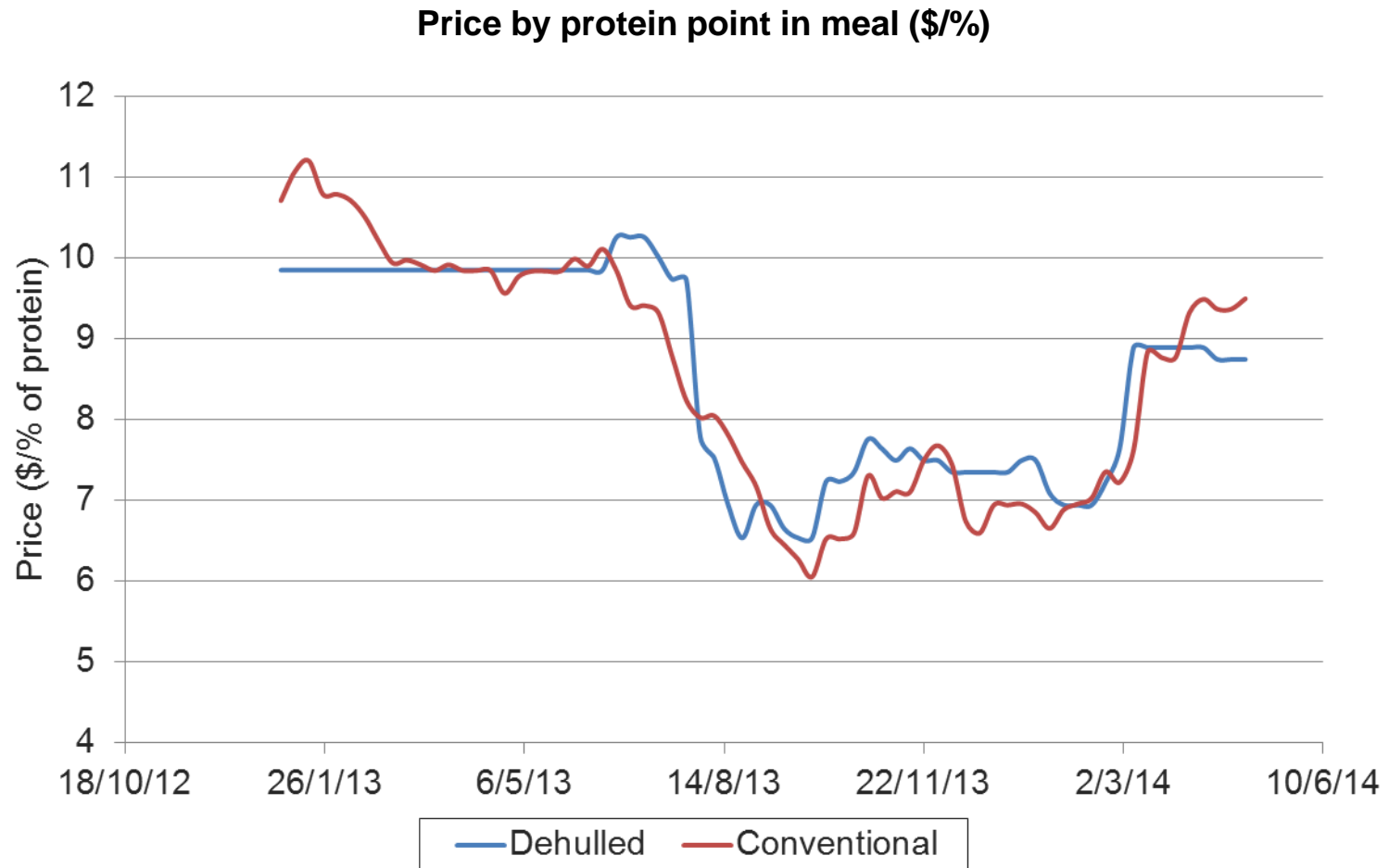
Human nutrition – Launch of new meat substitute in the world (2000-2012)



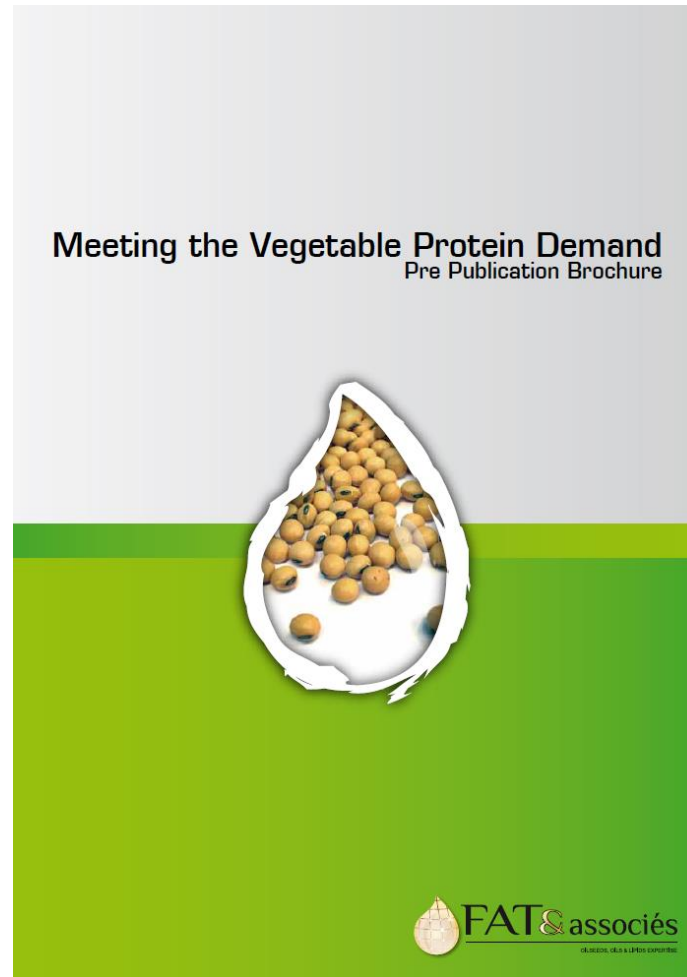
Valorization of dehulled sunflower meal protein content is historically lower than conventional sunflower meal's which underline a lack of interest for such product.



But, since the beginning of 2013, price by protein point of conventional and dehulled meal come closer. Dehulled sunflower meal become more and more valorized due to the increase of their use.



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