Future of meat industry

Abstract

Meat industry was influenced by the technological developments. However, the technology the meat industry was to be accepted by consumers and it should be feasible. In addition to all, meat industry was faced some other problems, which were also in general problems for humankind such as, global warming and its effects on livestock, stress on them and pastures. Moreover, due to increasing of human population and urbanization, agricultural areas stressed and prices of them increased. For this reason, feeding price of animals increased and as a result price of animal products increased. There is a little study about status of meat industry in the future. Also, these studies were not comprehensive and not including enough perspective for future of this industry. In this study, recent developments about the industry mentioned and also future perspectives were given except how climate change will effect of this industry. It was realized that, nanotechnology and genetic engineering applications could change our experiences on this industry completely.

Keywords: future of meat, meat industry, trends in meat industry

Introduction

Meat can be defined as “the muscle tissue of slaughter animals”.1 It is one of the most important feeding source for humans because it has high amount valuable protein and important micronutrients essential to provide good health for people,2 briefly. Some studies are available on meat industry, but not so much. For example, Tarrant2 illustrate some of scientific search priority areas for the meat industry in product safety, product quality and product development.3 Meat industry was affected by technological developments. The technologies that have key importance for meat industry was shown in Figure 1.4 In a study carried out by Kristensen L et al.,5 from 1950s to today, important technological developments of meat industry was given in detailed. For this reason, it is not mentioned again in this study.

Figure 1 The main technological steps for meat industry from 1950s to today.5

For meat industry, consumer preferences are one of the most important factors. Behaviours of consumers and their beliefs on meat and meat products rely on product itself and on the characteristics of the individual. Generally speaking and regardless of its traditional character and established social status, meat has a negative image generally, because it is relation of living animal, handling practices and slaughter conditions, the presence of blood, environmental issues and religious, ideological, ethical or moral concerns. Paradoxically, all these negative factors about meat seem to have a limited effect of consuming meat, it may possible as a result of low consumer knowledge.6

Consumption trends of meat around the world, its past, today and the expected future

Around the world, pork is consumed the most (15.8kg/capita/year), followed by poultry (13.6kg/capita/year), beef (9.6kg/capita/year) and finally sheep and goat meat (1.9kg/capita/year).6 Consumption of meat per capita is 80 kg in the developed countries and 27.9 in the developing countries, for a world average of 38.7kg.7 In Figure 2, meat consumption around the World was shown. It is easily to see that major differences are existed about consumption of meat in both its quantity and type.

Figure 2 Consumption (kg/capita/year) in 2009 of bovine meat (B), sheep and goat meat (M), pig meat (Pk), poultry meat (Py), and other meats (O) by continents.6

Global patterns about consumption of meat were changed over time. In 1950, pork and beef were totally dominated, and poultry was the third one.8 From 1950 until 1980, beef and pork production increased more or less apace. Then, in 1990, beef production amount around the World was increased from 19 million tons in 1950 to 53 million but were not expanded much after that time.8 Moreover, due to high conversion efficiency of grain for chicken meat than beef meat, World poultry production was increased over time then overtaking beef in the year 1997.8 In 2005, 245 million tonnes of meat was produced around the world, of which 30.8% was ruminant meat, mainly beef.9
Consumption of meat is projected to experience some deceleration following increases in per capita consumption in China and Brazil. Meat demand in developing world is projected to rise from 65 million tons in 1995 to 170-200 million tons in the year 2020. Also, according to a World Bank report, demand for meat around the globe is projected to increase by 56% between 1997 and 2020. According to FAO, consumption of meat in the year 2030 could be as high as 100 kg per person per year in developed countries. As Fiala projected that total amount of meat consumption around the world may be 72% higher in 2030 than consumed in 2000 following current consumption patterns. In Table 1, consumption trends of meat in aspect of per capita around the World was shown. There has been a significant rise for the meat consumption in some countries as Brazil and China, even though the levels are still below the consumption levels of developed countries.

Table 1: Per capita consumption of livestock products.

<table>
<thead>
<tr>
<th>Region</th>
<th>Meat (kg/year)</th>
</tr>
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<tbody>
<tr>
<td>World</td>
<td>24.2</td>
</tr>
<tr>
<td>Developing countries</td>
<td>10.2</td>
</tr>
<tr>
<td>Near East and North Africa</td>
<td>11.9</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>9.9</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>31.7</td>
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<tr>
<td>East Asia</td>
<td>8.7</td>
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<tr>
<td>South Asia</td>
<td>3.9</td>
</tr>
<tr>
<td>Industrialized countries</td>
<td>61.1</td>
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<td>Transition countries</td>
<td>42.5</td>
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Table 1: Per capita consumption of livestock products. Excludes South Africa.

Consumption of meat per capita in developed countries is expected to increase by 14% during next year’s up to 2050, but this includes all the countries with relatively still low consumption such as countries of the former Soviet Union. For this reason, total demand on meat is estimated to grow to 1.3% p.a. until the year 2050. In addition, it is expected that, in 2050, meat consumption will increase moderately, and this will take place largely increases in pork and particularly poultry because they have more efficient and short reproduction cycles than ruminants. According to IFPRI, annual per capita meat consumption is projected to increase, on average, from 90 kg/person per year to over 100 kg between 2000–2050 in high-income countries, and from around 25 to nearly 45 kg/person per year in low-income countries during the same term. Yearly, around the globe, meat production is estimated to double from 229 million tonnes in 1999-2001 to 465 million tonnes in 2050 unless policy induced changes of trend. Most of this increase is expected to take place in middle or low income countries. According to N Alexandratos et al., it is expected to increase of 72%, 110% in bovine meat and ovine meat respectively, by 2050 compared with 2000. Even large environmental and ethical implications, consumption of meat is projected to increase in the future. However, some of researches have opposite idea from this because growing numbers of vegetarians around the globe and other factors in industrialized countries. Most of studies about meat consumption projections based on a simple logic that when earnings rise consumption of meat also rise because it is usually considered a normal good. However, the vice-versa situation could be taken place in the future world due to consumer behaviours and maybe political reasons.

Consumer ideas about meat products for today and future

Behaviours and ideas of consumers about meat products are critically important subject for the meat industry since it has direct effect on industrial profitability. A lot of studies have resulted that perceptions of consumers on meat products are complex, dynamic and difficult to define. By the aid of scientific developments the profile of meat industry for meat and meat-derived products was improved for people in aspect of safety, quality and product stability. Unfortunately, meat industry has some important problems in aspect of consumer perception especially in the areas of health (nutrition), animal welfare and convenience. Harrington was listed concerns of consumers: ethical, food safety, nutrition and fat, animal welfare, “third world”, the environment and genetic engineering, still remains valid. In addition, in a study carried out by Vinnari possible things that may have impact on future consumption of meat was studied. The most important attributes that consumers give to meat are taste, value for money and health. Consumers desire to consume healthy meat products that obtained from sustainably raised animals. Also, they are desired to trust that food is manufactured by obeying their own ethical standards. Debates on “natural” and “organic” products in aspect of their quality and safety is estimated to be maintained among the consumers. However, behaviours about genetically modified meat are clear. For example, in survey carried out in EU opinion formers by Grunert suggests that no one can think for consumption of transgenic animals.

Recently, consumers desired to consume healthier meat products that have some special characteristics such as decreased level of fat, cholesterol, reduced contents of sodium chloride and nitrile, improved composition of fatty acid profile and incorporated health enhancing ingredients are quickly raising trend around the globe. These demands are able to provide big opportunities for meat industry. In principle, production of in vitro meat could be carried out with stem cells from various species including animals not presently used for meat production. The future of cultured meat highly depend on consumers’ opinion of the product. Vinnari was demonstrated effects of some factors that possibly attract consumption of meat in the future. Consumers are more likely to accept a new application or technology if they have an option to accept or reject to it. For this reason, not only for today but also for the future, companies should be careful about informations of labels on packaging. For example, companies should add not only nutritional values of meat but also add if the meat was produced by using a novel technology or method (e.g., genetically modified, man-made etc.) on label. Use of correct informations on labels are not just an ethical situation, it is also one of the keys to solve for safety concerns of consumers. In this aspect, companies should be clear for providing informations about their products for today and future.

Changing with life conditions eating habits are also changed. For example, people are preferred to consume ready to use products, e.g., more convenient products to prepare for eating. It is possible to increase consumption of meat by aid of technology such as development of less energy intensive meat products and the development some products that have shorter cooking times. On the other hand, some of technological developments may have negative effect on consumption of meat. For instance, development of cultured
meat, development of novel protein sources other than meat and the development of processing and packaging (lessening the amount of unusable meat).\textsuperscript{14} Even though level of meat consumption in industrial countries may approached its saturation level, people in these such countries have some different demands such as meat with no additives or chemical residues, exposed to minimal processing; convenient and needing little preparation; safe; and economic.\textsuperscript{20} For these reasons technological developments for meat industry are expected to meet these kinds of demands in the future. On the other hand, different products are available in the market as reduced fat, consumers are desired to prefer healthier products, but they are not desired to pay money for products whose flavour or taste changed significantly.\textsuperscript{30} For this reason, it should be careful about that during a product development for meat industry, flavour and aroma properties have to be protected. Some other market trends not related with health and nutrition are welfare of animals and traceability of products.\textsuperscript{30} Systems for optimal animal welfare is expected to be even more important and sustainability is also expected to be no longer just a consumer trend but also a license to operate.\textsuperscript{1} Briefly, the future battlefield in meat industry is expected to be an arena consisting of environmental efficiency, optimal utilization of raw materials, production efficiency and healthy meat products.\textsuperscript{5}

Present and future developments for meat science & technology

Today, much more amount of meat has to be produced with the same input sources, that is, production efficiency should be increased and production should sustainable for environment. In practical terms this means a minimum level of emission of climate gases, land usage as well as energy and water consumption. These are probably the most important standards for the future industrial production of meat.\textsuperscript{3} On the other hand, people are expected to healthier meat products from industry. For example, lower the salt content of meat products. There are three possible way to decrease salt amount of meat products. Firstly, sodium chloride may be replaced by potassium chloride. Secondly, flavour enhancer may be added to the meat product. Thirdly, the physical structure of sodium chloride could be altered.\textsuperscript{31} Moreover, in the medium term, using of conjugated linoleic acids (CLAs) for meat products offers some important opportunities for meat industry such as lower drip loss and better lean colour but above all, a large potential effect on human health.\textsuperscript{29} A proteome is defined as the protein complementary part of a genome.\textsuperscript{32} Presently, usage of proteomics in meat sciences is not common since it is in an early stage, and only a few studies are available. However, proteome studies may provide valuable information when implementing proteome technologies to muscle- and meat studies of livestock species.\textsuperscript{32} As proteome technologies develops, useful methods to control of niche products, e.g. related to religious regulations are also become easier. For instance, to control of kosher-food to be sure that mixing of any pork tissue or part into food products are not present. Proteomics may also useful to understand authenticity of food products, such as the confirmation of animal’s origin.\textsuperscript{32}

Meat industry is forced to develop new products with altered and novel formulations. This requires also flexible production lines. Innovative microbial, plant or animal enzymes maybe used for meat industry to modify texture of meats and meat products.\textsuperscript{33} Unfortunately, up to today no real commercial success has been noticed in adding nutrients to meat products.\textsuperscript{30} Also, in the future, there may be more room for in retail channels for specialized meat products. For example, products that are both convenient and provide less visibility of the meat ingredient which seeing of meat may cause avoidance, it is a trend restricted to certain consumer groups to consume meat and meat products.\textsuperscript{15}

In the next years some applications like electrolyzed oxidizing water, high pressure in combination with antimicrobials, irradiation and light pulses, and surface sanitizers such as chlorine dioxide, cetlypyridinium chloride, and lactic acid may more commonly available and possibly improve the shelf life of meats and meat-derived products.\textsuperscript{31}

Study carried out by Kristensen L et al.\textsuperscript{3} explain the possible applications of Radio Frequency (RF) and Volumetric Assisted Heating Processes technologies in the meat industry. To drive the material forward through the process, vacuum fillers may be used. More recently, high vacuum filling machines have been developed.\textsuperscript{31} Novel technological developments include high hydrostatic pressure, electroporation with pulsed electric fields, ultrasonic waves, oscillating magnetic fields, cell lysis with bacteriophages or enzymes, smart antimicrobial packaging or edible antimicrobial films, and various combinations of such treatments or processes (e.g., mano thermo sonication involving ultrasonic radiation, pressure and heat; irradiation and heat; pressure and heat) are also have chance to use in meat industry.\textsuperscript{21} The combination of meat quality management and sophisticated measuring technologies is able to revolutionize the slaughterhouses other than we know them today. The number of possible stock keeping units is expected to be unlimited, and even customer adapted products can be produced as specifications are being conceived. The trend is going to toward higher flexibility due to smaller production series and more product variant.\textsuperscript{3} The high level of automation and many interconnected sensors may provide information piece-by-piece that will be compiled for online holistic information. Further integration in the value chain is possible, and relevant information from the farm, the transporter, the slaughter house, the processing, retail and so forth opens up for completely new possibilities in a globalized meat industry.\textsuperscript{2} Also, more off-the-shelf automation sub-systems is projected to be available, decreasing the cost of technology.\textsuperscript{23} The ideal meat products that maybe available in the future are summarized as follows:

As far as Food Safety is concerned no concession is probably be accepted by the consumer. Novel technologies such as Pascalisation, use of protective bacteria and use of specific pages are expected to introduce. On the other hand, if industries cannot find a solution for reducing level of sodium and fat in meat products without major differences in taste and flavour, substitutes may obtain a chance.\textsuperscript{30} According to Vandendriessche F et al.,\textsuperscript{30} meat products in the future should have perfect shelf-life, that is, much more longer than today’s shelf-life, have no food safety risk, also have optimum taste, aroma and flavour which is ideal for your health and without diet restrictions. The product that is closest to this is probably the winner of the meat industry. However, quality, especially the sensorial quality, is not expected to change significantly in the close future.\textsuperscript{36}

Future prospects of genetic researches in meat industry

Food demand is increasing because of population increase, for this reason, production of cheap but nutritive foods for huge population, and also the need to increase sustainability of farm animals might motivate food production from genetically modified animals in the
future. The vast majority of animals that are genetically modified to produce food and feed are presently just in research stage, and few are close to final approval but none of them is available on market yet. Garnier JP et al. explain that expected developments of meat industry and meat products in the future by aid of genetic engineering applications with details. Biotechnology in animals (cloning, transgenesis or transgenesis followed by cloning) has big potential to improve the quality, yield and safety of food products by direct genetic manipulation. In addition of all, a study that is genetically modified fish has been under evaluation by different authorities as Food and Drug Administration (FDA) and other US agencies for more than 15years. Presently, it is close to final evaluation; this product maybe available on the US market in the near future.

Advances in food biotechnology and in the production of genetically modified organisms (GMO) is projected to be continuing as a controversial topic, but potentially less so than in the past. In the future, the developing countries is expected to play an critical role in searching, developing and marketing of genetically modified (GM) animals and fish for food productions. However, it is important to note that even science of GM animals applications have great successful in the future, the real success or failure of GM technology in the food production industry will be determined by consumer attitudes by accepting or rejecting of this technology.

**Nanotechnology in meat industry, future prospects**

Packaging applications by using nanotechnology are presently the most promising area of nanotechnology for using in meat and meat products. Some application examples are available such as gold nano particle incorporated enzymes for microbe's detection, gas sensing related to condition of food products: nano fibrils of perylene-based fluorophores indicates fish and meat spoilage by detecting gaseous amines. On the other hand, it is possible to use nano sensors to detect small organic or inorganic molecules such as melanine, pesticide, some protein-based bacterial toxins, etc. that are harmful for meat products. By using nanotechnology some differences are probably take place in the future of meat processing as mentioned followings: meat derived bioactive peptides, pro-and pre-biotics inclusion in processed meat products, fat based nano emulsions for antioxidant delivery, nano sensors and nano tracers for meat bio security tracing and nanostructured meat products with defined functions. New horizons for nanotechnology in meat science may be achieved by further research on nanoscale structures and methods to control interactions between single molecules. Furthermore, by aid of nanotechnology fibrillar protein aggregates can be developed as meat replacers, and by this way fibrillar protein to be constructed to imitate meat. If its taste and other organoleptic properties are sufficiently similar to meat consumers will probably like it.

**Man-made meat and its expected future**

Globally meat consumption is projected to double throughout the next several decades. Without important advancements in meat science and technology, with increasing of demand of meat, meat prices are possibly increased and this cause becoming of meat unaffordable to a large population. For this reason, there should be a novel solution to supply meat for people to future terms, the idea of man-made meat could be a solution for this problem. Langelaa ML et al. explain the past developments of man-made meat technology, briefly. There are some reasons to promote IMPS such as animal welfare, controlled and hygienic production conditions, environmental considerations as well as efficiency of food production in terms of feedstock. According to Tuomisto HL et al. IMPS might reduce land usage by 99%, water usage by 90% and energy consumption by 40%. If realized, these reductions lead to a large reduction in GHG emission. However, it is suspected that myocyte culturing would have a reduced water, energy and land requirement because a) solely muscle tissue is cultivated, bypassing the development of by-products and non-skeletal muscle tissues; b) for the same mass of meat, tissue cultivation is anticipated to be faster than growth to a slaughter ready age and c) in vitro meat production systems are capable of increasing in volume vertically, making deforestation to create pasture unnecessary. Up to now, only some basic developments were happened for artificial meat production system. That is, only embryonic stem cell lines originating from several model species and humans have been isolated and cultured successfully. At present, dimensions of cultured meat are nearly 1.5cm in length and 0.5cm in width. There are many articles and discussion on media about man-made meat technology. There was a specific study about this, e.g. As a result of research by Goodwin J et al. presently, man-made meat technology is supported by printed media. For this reason, it is likely that consumers are expected to develop favourability for the man-made meat products if media support continues to the product.

Economically, global cost savings of replacing traditional meat with that produced in vitro could be more than $130billion per year. By taking the appropriate stem cells, proliferating them under the right conditions to reach sufficient numbers and providing them with the right stimulatory signals in a 3D environment, industrial meat production seems feasible. Unfortunately, there are some technical problems to obtain efficient cultivation of muscle cells. First of all, appropriate cells capable of proliferation and differentiation must be selected and cost-effective growth media developed. Secondly, food-compatible and edible substrates necessary for muscle cell attachment, growth and maturation must be developed and should also contribute to the texture of in vitro meat. Thirdly, production must be scalable for industrial production. Fourthly, high nutritional value and consumer acceptance of novel products containing in vitro meat must be attained. Furthermore, taste is arguably the most difficult to imitate, because, over the 1000 different components that are water soluble and fat derived are necessary to obtain strain specific taste of meat.

The future of artificial meat is mostly depending on consumers' ideas and behaviours about the products. Also, although clearly this will have been an illegal activity the development of such technological capability might motivate some people with malicious intent to consider producing in vitro human flesh for consumption. For this reason, politicians should care about this topic before acceptance marketing of man-made meat.

**Probiotic products of meat and developments; future prospects**

A food can be regarded as functional if it is satisfactorily illustrated to have useful effect on one or more target functions in the body. Meat is possibly considered as a functional food even if no addition of any nutritional component into it since it has lots of healthy components. As the economy develops, people are expected to consume healthier and functional meat products. These demands provide great opportunities for meat industry. For example, the consumer demands products have some important properties such as decreased level of fat, cholesterol, reduced contents of sodium.
chloride and nitrite, improved composition of fatty acid profile and incorporated health enhancing ingredients are rapidly increasing worldwide. Functional foods have a great potential for the meat industry, to improve the quality and image of meat by aid to develop products have useful health features.33 It is possible to develop health beneficial meat products, containing functional foods with many different methods. Strategies suggested by Jiménez Colmenero F et al.,45 were listed below:30

a) Alteration of carcass composition
b) Alteration of meat raw materials
c) Reformulation of meat products
i. Decreasing of fat content
ii. Alteration of the fatty acid profile
iii. Decreasing of cholesterol
iv. Decreasing of calories
v. Decreasing of sodium content
vi. Decreasing of nitrates
vii. Incorporation of functional ingredients

The items of functional modification in meat and meat products listed below have recently been reviewed by Fernández Ginés JM et al.47 & Arihara K.46
i. Alteration of fatty acid and cholesterol levels in meat
ii. Addition of vegetal oils to meat products
iii. Addition of soy
iv. Addition of natural extracts with antioxidant properties
v. Sodium chloride control
vi. Addition of fish oils
vii. Addition of vegetal products
viii. Addition of fibre

Future for insects as an alternative protein source

Rising pressure on agricultural areas is caused that meat production by livestock to be less sustainable than ever before. It is because that raising of livestock, including feed crop production, occupies 70% of the world’s agricultural land (or 30% of the earth’s land), and consumes 77million tonnes of plant or animal protein to produce just 58million tonnes of protein for human consumption annually.42 For these reasons, nowadays insects are noticed as, again, alternative protein source for humankind. The practice of eating insects is known as entomophagy. It is an age-old phenomenon. By all accounts, which include archaeological evidence as well as analysis of fossilized feces, mankind has evolved as an entomophagous species.48 It is estimated that number of people that consume insects regularly is at least 2billion around the World. In addition, more than 1900 insect species have been documented in literature as edible.49 Mainly some tropical and sub-tropical regions and countries like as Zimbabwe, Mexico, Thailand and also in more temperate regions such as Japan and some parts of China insects are being eaten.50

Main nutritional component of insects is proteins. Fat is second important nutritional component of insects.51 Furthermore, insects have not only large amount of proteins but also high quality of proteins implies that it contains different types of amino acids in adequate proportions and that it is highly digestible by the organisms that consume it.52 In addition, except pork, energy value of insects is competitive with meat energy value averagely (on a fresh weight basis).53 Insects are required to ten times less feed than cattle for obtaining of 1kg biomass.54 Moreover, insects emit fifty times less emissions than traditional livestock and ten times less ammonia. Also, less risk of animal diseases being transmitted to humans is present.55 As a result, insects are required less energy and so cause smaller environmental foot prints to obtain protein, especially if closed systems can be developed at the village or farm level.56 The other advantages of using insects as an alternative protein source that they may aid economic developments for rural areas, i.e., small scale, women-orientated mini-farms of edible insects operating in the villages which surround national parks can provide a boost of local family income.55 It is expected that insects may have a $350million value market in 10years as an everyday food source.56

Although insects have many beneficial properties, they have also some harmful properties that should also be considered. Some of these harmful properties and effects were mentioned in the study carried out by Pal P et al.,57 Rumpold BA et al.58 Before fully commercializing of insects, such important issues should be solved. More importantly, consumer awareness and opinions should be positively developed for consumption of insects as an alternative protein source. To overcome consumer opposition at the first time some new processing methods such as grinding the insects or extracting their proteins could be used.52

Conclusion

Human population increased almost exponentially and rate of urbanization increased in a short time interval. In addition, global warming is threatening livestock with different affects. Future of meat industry is affected from all these factors and more. Increasing of human population will have increased demand on foods, especially for meat products. However, if a more sustainable and economic way to produce these products will not have found, it could possible that increase in price of the products in the future. For this reason, today scientists should be performed to find alternative ways to obtain livestock products. For example, man-made meat was produced nowadays and this technology is seemed as so promising for the future. That is not all, also some other technological developments took place to produce more value added, better textured and taste, faster production lines for livestock products. Even all these technologies are not applied in industry today, for the future, they are so promising.

According to today trends it is clear that, in the future, functional foods will have been more and more important than today for livestock product industries. In addition, due to personal products could be more common, also more flexible production lines and more different kind of products could be available in the future. Moreover, in the future, some other products maybe more popular than today as edible insects. Even they are irritating for most of people, maybe in the future not directly consumed but their proteins could be isolated and used as a source for specific products, so people could be more easily adapted to these kind of products. More importantly, due to women were entered to working life more than past, and similar trend will have observed in the future, more convenient, easy to use products could be common
in the future. It is because, women may desired to use less time during cooking their meals. In this aspect, chicken nugget and similar kind of products could be more and more common in the future.

Nutotechnology and genetic are two specific areas that could also importantly affect future of meat industry. For the near future, possibly, these technologies will not have directly used in food products, but they could be used indirectly such as packaging applications. However, in the far future, maybe end of the 2100, these two technologies could be used directly to obtain more valuable, nutritious, healthy and improved shelf-life properties meat products. Meat industry will have been affected by politicians and their political decisions. Politicians should give their decisions carefully because these industries are so sensitive and affected from their decisions.

As a result, there are many factors that could affect future of meat and milk industries. All these factors should be evaluated carefully in aspects of their effects on these industries. Keep in mind that, future is shaped by today, so, to obtain more sustainable and reasonable livestock products industries in the future, it is needed to estimate all these factors in a realistic perspective.

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Conflicts of interest

The author declares no conflicts of interest.

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