Agriculture and Farmers Situation In 2030

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General overview of existing and future situation

It is a very difficult to predict agriculture and farmers situation in 2030. I wonder if anybody has predicted accurately the present situation in these areas. The events that led to the present state of affairs sometimes or in great extent were consequences of unexpected developments that had occurred in politics, sciences and technology. Therefore, the actual presentation of the future situation bears huge dose of uncertainty as it is based on present perception, understanding and estimates of the future development.

It is generally assumed that the world population will grow from around 6 billion people today to 8.3 billion people in 2030. Notwithstanding the slowdown in demographic growth, the developing countries' population will still grow from about 5 billion today to 5 804 million in 2015 and to 6 840 million in 2030.

As a result, the growth in world demand for agricultural products is expected to slow further, from an average 2.2% annually over the past 30 years to 1.5% per year until 2030. In developing countries, the slowdown will be more dramatic, from 3.7% for the past 30 years to an average of 2.0% until 2030.

To meet the growing demand for food by 2030, the world cereal totals must increase by almost another billion tonnes from the current level of 1.9 billion tones as well as another 160 million tonnes of meat will be needed, and so on.. Of this increment in cereals, just over one half will be for feed, and about 42% for food, with the balance going to other uses (seed, industrial non-food use and waste). Among the non-food use of cereals, a substantial part of the cereals will be spent for biofuel production. In the developing countries production is projected to be 67% higher than in the year 1999. Most of this increase (about 80%) would be due to intensification of crop production and the remaining 20% due to arable land expansion. The bulk of the increases in world consumption of crop and livestock products shall occur in the developing countries.

The projections of food demand for the different commodities suggest that the per capita food consumption (kcal/person/day) will grow significantly. The world average will be approaching 3 000 kcal in 2015 and exceeding 3 000 kcal by 2030. These changes in the world averages will reflect above all the rising consumption in the developing countries, whose average will reach 2 850 kcal in 2015 and almost 3 000 kcal in 2030. This means that the great majority of people will be better fed and the incidence of under-nourishment should decline. In developing countries, however, the numbers undernourished will decline only modestly: from the 776 million in 1997/99 to 610 million in 2015 and to 440 million in 2030 due to general increase in population.

The total agricultural area of the world is about 5 billion ha. Of this, about 1.5 billion ha (30.4%) is arable land and land under permanent crops. The developing countries have some 2.8 billion ha of land with a potential for rain-fed agriculture. Of this total, some 960 million ha are already under cultivation. Most of the remaining 1.8 billion ha however cannot be considered as land "reserve" since the majority of the not used land is concentrated in a few countries in South America and sub-Saharan Africa. Some of this land is covered by forest so it is very likely that additional 120 million ha needed for crops until 2030 in part, at least, will come from deforestration.

At present, at the world level, production equals consumption. In developing countries, however, demand for food grew faster than the rates of production and as a result many of them from net exporters are turning to net importers of agricultural products. The net imports of the developing countries as a whole of the main commodities in which they are deficit, mainly cereals and livestock products, will continue to rise fairly rapidly. In parallel, their net trade surplus on account of their traditional exports (e.g. tropical beverages, bananas, sugar and vegetable oils) will either rise less rapidly than their net imports of cereals and livestock products or outright decline. On the other hand, the developed countries will be still net exporters of food due to several factors such as increased productivity, stable consumption, favourable environmental and climatic conditions, etc.

Commodities and bio-fuels

Cereals

Cereals will continue to be by far the most important source of energy in total food consumption. Within the cereals group, per capita food consumption of rice will tend to stabilize or decline but consumption of wheat will grow. For developing countries this means growing wheat imports. Their net cereal imports are projected to rise from 110 million tonnes in 2001/2002 to 190 million tonnes in 2015 and to 265 million tonnes in 2030.

The traditional cereal exporters in the industrial world (United States, Canada, the EU and Australia) are expected to increase their net exports from the 144 million tonnes in 1997/99 to 224 million tonnes in 2015 and 286 million tones in 2030. The Central and Eastern European countries (present EU members), in longer term, also have the potential to be net exporters of cereals. Their net exports in years 2015 and 2030 may reach 10 and 25 million tonnes, respectively.

The potential problem connected with the traditional exporting countries lies in attitudes of their citizens toward the type of agriculture they have. Concern with adverse environmental impacts of intensive agriculture may lead to decisions leading to decrease an ever-growing export surplus. In this respect, their assumed increment of 242 million tones in year 2030 from 629 million tons, in years 1997-1999, to 871 million tons in year 2030 may be endangered. Another aspect that can jeopardise future exportation of cereals for food and feed is related to their growing use in production of bio-fuels.

Biofuels

By 2030, the European Union shall cover as much as 25% of its road transport fuel needs by clean and CO_2-efficient biofuels as compared to less than 2% at present. It is estimated that between 4 and 18% of the total agricultural land in the EU would be needed to produce the amount of biofuels to reach the level of liquid fossil fuel replacement required for the transport sector in the Directive 2003/30/EC.

The biomass resource potential till 2010 is estimated at more than 180 Mtoe. More than half is expected to derive from waste and residual forms of both agriculture and forestry origin (2nd generation biofuels). The remaining is expected to derive almost equally from wood and energy crops (1^{st} generation biofuels). The figures for 2020 and 2030 reach up to 227 (239) and 280 (316) Mtoe, respectively.

The annual use of agricultural wastes for energy production in years 2010-2030 will be almost at the same level 100 Mtoes but its share in the total biomass used for energy will fall down from about 53% to 36%. On the other hand the quantity of agricultural products used annually, in years 2010-2030, for energy production will increase from about 45 to 120 Mtoes and its share in the total biomass used for energy production will increase from about 24% to

44%. The first generation bio-fuels could have substantial influence on grain trade balance of the EU.

Oil products

Oil products constitute second after cereals source of energy in food consumption. In year 2030, 45 of every 100 calories will originate from these products. These products still have significant scope for further consumption increases. On the demand side, the major driving force of the world oil crops economy has been the growth of food demand in the developing countries, with China, India and a few other major developed countries. Additional significant demand growth has been in the non-food industrial uses of oils and in the use of oil meals for the livestock sector.

Livestock and animal products

The world food economy is being increasingly driven by the shift of diets toward livestock products. Recently, the world demand for meat grew at the rate 2.9% annually. In the developing countries, however, in the last few decades, consumption of meat has been growing at 5-6% per annum, and that of milk and dairy products at 3.4-3.8%. The trend for the developing countries to become growing net importers of meat is set to continue. However, it is very unlikely to expect further strong growth in meat consumption in China, Argentina and Brazil. Similarly, it is rather unlikely to expect further growth in meat consumption in the developed countries. The result is that the growth rate of world meat demand and production could grow at rate 1.7% annually, in the period to 2030. It is rather possible to expect shift in eating consumption pattern.

In meat production, a rapid growth was observed in the poultry sector. Its share in world meat production increased from 13% in the mid-1960s to 28% currently, while per capita consumption increased more than threefold over the same period. Poultry will continue to increase its share in world meat output and the meat trade will continue to expand.

Unlike meat, higher growth in the world **milk and dairy sector** than in the recent past is expected because of recovery in the EU New Member States (NMS). Trade in dairy products will also likely recover with the net imports of the developing countries and net exports of the developed ones.

Livestock production accounts globally for 40% of the gross value of agricultural production (and for more than half in developed countries). Developing countries will continue to increase their part in world production, with their share in meat going up to two-thirds of the world total by 2030 and in milk to 55%. The trend for the livestock sector to grow at a higher rate than the crop sector will continue, however, lower than at present.
The increase in the number of animals will remain an important source of growth, but also a higher carcass weights will play a more important role in beef production and shortening production cycle in pig and poultry meat production.

The increase in livestock production will be influenced by several factors such as: growing use of industrial made cereal-based concentrated feeds, growing competitiveness for resources for animal production, growing specialisation in animal production and of production scale, greater attention paid to the environmental, health, sanitary and hygienic issues.

Fish

Fish remains a preferred food for many people. The global average per capita consumption could grow to19-20 kg by 2030, raising a total food use of fish to 150-160 million tonnes (97 million tonnes in 1999). In the 1990s, marine capture fisheries have shown annual catches of between 80 and 85 million tonnes. Inland catches increased slowly to 8.3 million tones in 1999. By the end of the 1990s, an estimated 47% of major marine fish stocks were fully exploited, about 18% over fished, and another 9% depleted. Only a quarter of the fish stocks were moderately exploited or underexploited. The long-term yearly sustainable yield of marine capture fisheries is estimated at approximately 100 million tonnes and these includes large quantities of currently minimally exploited living aquatic resources in the oceans, of which the most well known are krill, mesopelagic fish and oceanic squids.

By 2030, the sustainable management of fish stocks in the EU and internationally, securing the long-term viability of the EU fishing industry and protecting marine ecosystems should be operational and functioning. In this respect, counter-productive subsidies which encourage over-fishing will cease to exist and the size and activity of EU fishing fleets shall be reduced to a level compatible with worldwide sustainability.

The bulk of the increase in the fish supply will therefore have to come from aquaculture. By 1999 aquaculture accounted for 26% of world fish production and 34% of fish food supplies. This growth could continue for some time, although constraints are becoming more binding. Unless these constraints are relaxed, the long-term growth prospects of aquaculture, and hence of fish consumption, could be seriously impeded.

The proportion of fish reduced to fishmeal and oil (at present some 30 million tonnes) is likely to fall despite of growing demand for fishmeal. In future, the fishmeal industry will be forced to find other sources of raw material, the most likely of which is zooplankton.

Influence of Agriculture on Environment and Climate

The substantial gains in agricultural production and productivity achieved in the past were accompanied by adverse effects on the resource base of agriculture that jeopardised its productive potential for the future. Among these effects are land degradation; salinization of irrigated areas; over-extraction of underground water; growing susceptibility to disease and build-up of pest resistance favoured by the spread of monocultures and the use of pesticides; erosion of the genetic resource base when modern varieties displace traditional ones and the knowledge that goes with their use. Agriculture also generated adverse effects on the wider environment, e.g. deforestation, loss or disturbance of habitat and biodiversity, emissions of greenhouse gases (GHGs) and ammonia, leaching of nitrates into water (pollution, eutrophication), off-site deposition of soil erosion sediment and enhanced risks of flooding following conversions of wetlands to cropping.

The preceding considerations and the magnitudes involved suggest that the increases in production and associated progress in food security cannot be achieved at zero environmental cost. In livestock, the shift from ruminant meat to pork and poultry may slow down the growth of methane emissions from ruminant livestock but will aggravate the problem of livestock effluent pollution from large pig and poultry industrial units. In plant production the increased productivity may be associated with growing use of fertilizers and pesticides. Often the choices present themselves in the form of what are acceptable trade-offs, rather than whether we can have something for nothing.

For most of the people it is almost unnoticed that agriculture in a great extent contributes both negatively and positively to climatic changes. Agricultural activities contribute to climate change through the emission of GHGs. They also contribute to climate change mitigation through carbon sequestration in cropland and the provision of biofuels that can substitute for fossil fuels. Agriculture generates some 30% of total anthropogenic emissions of GHGs. The main ones are carbon dioxide (CO_2 – agriculture accounts for about 15% of total anthropogenic emissions); methane (CH_4 – about 50% coming from agriculture); and nitrous oxide (N_2O – agriculture accounting for about 66%) and NH_3. In year 2030, the annual methane emissions from livestock (animal waste) could increase by 60% and growth of nitrous oxide emissions from fertilizers by some 50%. Both CH_4 and N_2O are gases with warming potentials many times higher than that of CO_2. The main source of CO_2 emissions is tropical forest clearance, related biomass burning and land use change, in lesser extent animal production.

There are agricultural technologies that can sequester GHG. Agricultural land sequesters carbon in the form of vegetation and soil organic matter (SOM) derived from crop residues and manure. The potential exists for it to sequester much more carbon than it actually does under most current cropping practices. No-till/conservation agriculture will lead to increase carbon content in the soil, and it also contributes to lower GHG (Greenhouse Gases) emissions through the reduced use of fuel. Permanent set-aside of agricultural land would sequester large amounts of carbon if forested or left to revert to tree scrub. Finally, degraded land that has gone out of production, e.g. saline soils, could be restored to sequester carbon.

All these phenomena are contributing to the climate changes that impacts agriculture. For next 2 decades, a warming for about 0.2^oC per decade is projected. In very optimistic scenario with the GHG kept at the present constant level a temperature increase by 0.1^oC per decade is inevitable. Some researchers are expecting temperature to rise even 1^oC by 2030. Even with arrest level of GHG, the warming will continue and the at end of this century it is likely that Greenland ice will melt down and sea level will rise 7 m, comparable what we had 125 000 years ago.

Projected warming is expected to be the greatest over land and at the most high northern latitudes and least over the Southern Ocean and North Atlantic.
Climate change is projected to increase global mean precipitation and runoff by about 1.5 to 3% by 2030. Precipitation increases in the highest latitudes and decreases in most subtropical land regions. Also Europe may suffer appreciable falls in available water resources. As a result of both these phenomena sea levels could be about 15 cm higher by 2030.
Temperature and precipitation changes will affect the extents of land that is suitable for growing crops. Suitable areas will increase in higher latitudes because of milder and shorter winters hence longer vegetation period, and will decline in arid and semi-arid areas. Larger changes are predicted in the availability of water from rivers and aquifers because of reductions in runoff and groundwater recharge. Substantial decreases in water availability are projected for Australia, India, southern Africa, the Near East/North Africa, much of Latin America and parts of Europe. The main decrease in water availability will be after 2030 but there could be negative effects on irrigation in the shorter term.
Irrigation is expected to play an increasingly important role in the agriculture of the developing countries. At present, irrigated production is estimated to account for 20% of the arable land (but about 30% of harvested area because of its higher cropping intensities) and to contribute some 40% of total crop production (nearly 60% of cereal production). This share is expected to increase to 47% by 2030.

The substantial rise foreseen for average sea temperatures may have serious effects on fisheries. It could disrupt breeding patterns, reduce surface plankton growth or change its distribution, thereby lowering the food supply for fish, and cause the migration of mid-latitude species to northern waters. The net effect may not be serious at the global level but could severely disrupt national and regional fishing industries and food supplies.

Even small changes in average temperature can lead to major shifts in pests and disease vectors distribution and build up. Especially, if these are connected with disappearance of low winter temperatures.

The main impacts of the climate change on global food production capacity are not projected to occur until after 2030, but thereafter they could become increasingly serious. Up to 2030 the impact may be broadly positive or neutral at the global level. However the regional impacts will be very uneven. Food production in higher latitudes will generally benefit from climate change, whereas it may suffer in large areas of the tropics. In this respect traditional agricultural products net exporting developed countries such as USA, Canada and EU could benefit from the changes but not Australia and even Brazil. In the EU, however, the production conditions will improve in its northern and central parts and worsen in the southern. The changes in climatic conditions will also improve production conditions in the vast areas of Russian Federation and Ukraine.

Production means

Growing needs for bigger crop can be accomplished by increasing yield potential of the existing varieties of plants and increased area under cultivation. This requires continued support to agricultural research to develop improved varieties and also to adapt existing varieties to grow sometimes in harsh conditions of newly acquired land as well as to develop effective protection against pest and diseases.
The simplest way, however, is to increase doses of applied fertilizers. Fertilizer use (nutrients NPK) in the developing countries is projected to increase by 1.1% per annum from 85 million tonnes in 1997/99 to 120 million tonnes in 2030 (at world level from 138 million tonnes to 188 million tonnes). This is a drastic slowdown as compared with the past (e.g. 3.7% for 1989-99). Fertilizer use per hectare in the developing countries is projected to grow from 89 kg in 1997/99 to 111 kg in 2030 (near the current level of use in the industrial countries).
In parallel, overuse or inappropriate use of fertilizers creates problems of pollution. The farmers must be taught of mitigating such adverse effects by recycling all plant nutrient sources within the farm and use of nitrogen fixation by legumes to the extent possible, complemented by the use of external plant nutrient input, including manufactured fertilizers.

In this respect, a help could come from modern biotechnology. The interest of many countries in the first-generation GM technologies results from the fact that they simplify production technology and make it cheaper. The knowledge required by farmers to cultivate crop is a great extend build into construction of the seeds. This is particularly important for environments where sophisticated production techniques are difficult to implement, are simply uneconomic or where farmers do not command the management skills to apply inputs at the right time, sequence and amount.

Significant changes are expected to occur in the mechanization of agriculture which will change the role played by the different sources of power in land tilling and preparation as well as harvesting. In future, it is likely to see further shifts towards the use of mechanical power substituting for both human labour and draught animals. In a greater extent, robots will replace human work during tilling, harvesting, milking etc.

In general, in a future, due to high energy costs, the energy input per unit of production or product will decrease. As a energy source, in a greater extent, it will be used renewable energy such as solar, wind and geothermic energy as well as heat pumps that recover heat from agricultural products, households and farm activities. These also include changes in cultivation methods (spread of no-till/conservation agriculture), in cropping patterns and in some factors affecting the rural workforce.

Environmentally friendly technologies

Certain segments of high-income societies with abundant food supplies do not accept any risks in order to have more and cheaper food, particularly when it comes to staples such as grains, roots and tubers. For them organic food is a natural choice. Although the growing demand for organic foods is to a large extent driven by health and food quality concerns, organic agriculture is above all a set of practices intended to make food production and processing respectful of the environment. Organic agriculture is essentially a production management system aiming at the promotion and enhancement of ecosystem health, including biological cycles and soil biological activity hence minimizing the use of external inputs and optimizing the use of local natural resources. Synthetic pesticides, mineral fertilizers, synthetic preservatives, pharmaceuticals, GMOs, sewage sludge and irradiation are prohibited in all organic standards. The emphasis placed on organic farming underlies one of the obvious facts that EU farmers will be rewarded for quality rather than quantity.

Naturally, this by itself does not guarantee the absence of resource and environmental problems characteristic of conventional agriculture. Soil mining and erosion, for example, can also be problem in organic agriculture.

Meanwhile, other promising technologies have emerged that combine in-creased production with improved environmental protection. These include no-till or conservation agriculture, and the lower-input approaches of integrated pest or nutrient management, etc.

Trade in agricultural products

Most studies that examined the possible effects of agricultural trade liberalization conclude that the lion’s share of gains in welfare would accrue to the high-income countries, and certainly to some developing countries exporters of competing products, e.g. cereals, livestock, sugar and vegetables. However, some developing countries could be harmed, such as those that enjoy preferential access in protected markets or those that have few agricultural exports but import much of their food.

In addition inconvenient location brings another problems for developing countries. In developing countries, the proportion of the population that is landlocked is seven times higher than in developed countries. In developed countries, 89% of population live within 100 km of the coast or of a navigable river, as opposite 21% in developing countries. These regions count for 3% of the world's inhabited land area but they house 13% of the world's population and produce at least 32% of the world's GDP. Nearly all landlocked countries in the world are poor, except a few in Western and Central Europe which are deeply integrated into the regional European market and connected by multiple low-cost trade routes.

The traditional agricultural trade surplus in the balance of payments of the developing countries has been diminishing over time and turned into a net deficit in recent years. Among factors influencing the international trade in agricultural products are the agricultural and trade policies of the main players in world markets, foremost among them the Organisation for Economic Co-operation and Development (OECD) countries. Most OECD countries have traditionally protected their agriculture sectors heavily, partly through policies granting domestic support and partly, and closely related to the former, through trade policies, such as tariffs, quotas and export subsidies.

In future, the importance of “classical” border measures (such as tariffs and quotas) gradually diminishes and the prominence in trade of the safety and quality standards increases. The latter concerns mainly the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), the quality attributes covered under the Agreement on Technical Barriers to Trade (TBT) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Recent food safety scares and the advent of genetically modified products have added to the influence of these standards in trade. Their application will be increasingly coming under scrutiny in order to minimize the risk that they will be used inappropriately to protect domestic producers from foreign competition.

Trade policy with respect to food and agriculture is gradually shifting beyond concentration on issues pertaining to primary farming to encompass issues and interests of the whole food chain, including food processing, marketing and distribution.

One of the FAO study indicates that gradual removal of price support and other subsidies until 2030 shall lead to moderate increase of international prices for agricultural products. Simultaneously, in countries with high level of protection, the prices shall fall substantially. The international trade will be beneficiary for these trading at international prices over these at inflated ones. Such development shall bring benefits for consumers in the developed countries with high market protection but not for farmers in these countries due to rising processing and distribution costs. The developing countries will be increasingly more dependant on importation of the agricultural products due to fact that modern increase in world prices are unlikely to turn them into net exporters, and in these countries consumers are likely to lose more from trade liberalization than their producers can gain.

Discussing about future agricultural products trade one must take into account the importance and the role played by trans-national corporations (TNC). They are an important element of globalization in food and agriculture and can make an important contribution as vehicles of capital, skills, technologies, access to both domestic and export marketing channels, and creation of linkages to the rural economy, for example through contract farming. However, they should undergo a certain scrutiny in order to avoid monopolization of certain segments of the agricultural markets by them.

Research for agriculture

The need to continue the agricultural research effort (including in biotechnology) to improve yields, even if yield potentials of existing varieties are not fully exploited is obvious. There are technological options to minimize risks and transit to a more environmentally friendly and resource-conserving agriculture, while still achieving the needed production increases.

The spread of science-based agriculture emanating from the significant past investments in agricultural research underpinned much of the growth of agriculture in the historical period. The need for further increases in production in the future while conserving the resource base of agriculture and minimizing adverse effects on the wider environment, calls for ever greater contributions from agricultural research.

Research must increasingly integrate current advances in the molecular sciences, in biotechnology and in plant and pest ecology with a more fundamental understanding of plant and animal production in the context of optimizing soil, water and nutrient use efficiencies and synergies. Effective exploitation of advances in information and communication technology will be necessary not only to facilitate interactions across this broad spectrum of scientific disciplines but also to document and integrate traditional wisdom and knowledge in the planning of the research agenda and to disseminate the research results more widely.

It follows that the research effort must be increasingly oriented in three directions, to support production growth and improve nutritional characteristics of products; to increase productivity in adverse environment and to minimize adverse effect on environment.

A new technology revolution should in greater extent focus on the poor by putting special emphasis on those crop varieties and livestock breeds that were largely ignored throughout the green revolution, but that are specifically adapted to local ecosystems. These include crops such as cassava and the minor root crops, bananas, groundnuts, millets, some oilcrops, sorghum and sweet potato. Indigenous breeds of cattle, sheep, goats, pigs and poultry and locally adapted fish species must also receive much greater priority. A particular focus in the new research agenda should be on plant tolerance to drought, salinity and low soil fertility since nearly half of the world's poor live in dryland regions with fragile soils and irregular rainfall.

Modern biotechnology is not limited to the much publicized (and often controversial) activity of producing genetically modified organisms (GMOs) by genetic engineering, but encompasses activities such as tissue culture, marker-assisted selection (potentially extremely important for improving the efficiency of traditional breeding) and the more general area of genomics. Even more interesting could be the eventual success of current efforts to introduce into crops new traits aimed at enhancing tolerance to abiotic stresses such as drought, salinity, soil acidity or extreme temperatures and even to give raw materials a certain characteristics and features needed by industry . Attempting to raise productivity in such situations using GM varieties can be the cheaper, and perhaps the only feasible, option given the difficulties of pursuing the same objective with packages of interventions based on existing technology.

Further efforts shall be made to develop crops that allow the production of nutraceuticals or "functional foods", medicines or food supplements directly within the plants. As these applications can provide immunity to disease or improve the health characteristics of traditional foods, they could become of critical importance for an improved nutritional status of the poor.

However, not all is bright with the potential offered by biotechnology for the future of agriculture in its main dimensions (enhancing production, being pro-poor, conserving resources and minimizing adverse effects on the environment). With the present state of knowledge, there persist significant uncertainties about the coexistence conditions for GM and non-GM crops, the longer-term impacts and possible risks of the GMOs, primarily for human health (e.g. toxicity, allergenicity) or for the environment, e.g. fears of transmission of pest resistance to weeds, buildup of resistance of pests to the Bt toxins or the toxic effect of the latter on beneficial predators.

Besides these possible retarding factors relating to the need for prudence and caution in the face of scientific uncertainties, there are other factors from the socio-economic and institutional spheres, often interacting with the former, that may act in the same direction. The principal among them have to do with the growing control by a small number of large firms of the availability and cost of inputs and technologies farmers will be using and of the use of scientific discoveries for the further development of technology.

In reality no one single factor but a technology and resource management will have a domination effect on future agriculture and farmers situation. Poor technology and resource management can lead to many environmental and raw materials related problems that will have an adverse effect on production and hence on farmers income.

Farmers situation

Unless local agriculture is developed and/or other income-earning opportunities open up, the food and/or income insecurity determined by limited production potential will persist, even in the middle of potential plenty at the world level. The need to develop local agriculture and non-agriculture related activities in such situations as a prerequisite condition for improving farmers situation cannot be overemphasized.

If anything, experience shows that the main beneficiaries of the sector tend to be a relatively small number of large producers in high-potential areas with good access to markets, processors and traders, and middle-class urban consumers.

Willingly or not, farming is going to be more business oriented activity with special environmental and social flavour. In the EU, farming will still undergo transition from commodity production and family based farm ownership to professional knowledge driven economic activities based in rural areas. In this respect and taking into consideration existing political and economical trends, it is hardly to believed that, in future, existing forms of support for farming will persevere. The actually observed shift of resources from market support to rural development will be accomplished, so the multifunctional European Model of Agriculture will be operational. On the other hand because farming in great extent depends on climatic and environmental factors they must be taken into account creating an agricultural policy. No doubt, the European farmers will have difficulties to compete with third country farmers in production of simple raw materials such as cereals, meat, sugar, etc. But due to their education and skill, they are and should be particularly good in producing high quality, nutritious, safe, speciality food with high environmental, hygienic and sanitary standards simultaneously preserving animal welfare criteria, and this shall be their strength in a future. Also due to their cultural and social background, they shall produce more highly prized PGI food. The real advantage, they must explore in a greater extent are hundreds of millions of potential customers in their close proximity, in EU and neighbouring countries. There is also another area of future profits. It lies in area of use of plants and animals for a production of highly priced medicals, vitamins, hormones, speciality compounds, rare speciality chemicals, etc. as well as raw material of special characteristics and use. This field of specialisation is a chance for survival even relatively small farms. Willing to be successful in all these areas, they must be educated, flexible, entrepreneurial and keeping pace with new and innovative technologies. They must be a part of knowledge based sustainable rural bio-economies.

Conclusions

The changing world, will impose a greater responsibility for farmers not only for food supply but also for environment. Being producers of agricultural products simultaneously they must be the custodians of biodiversity of the environment. They must be also prepared to act and thrive in changing economic, social and environmental conditions accommodating instruments of modern business and exploiting the achievements of the new technologies.