CEREAL POLICIES REVIEW

1998/99

Food and Agriculture Organization of the United Nations

FOREWORD

The 1998-99 edition of the *Cereal Policies Review* is the eighth in the annual series on recent developments in national cereal policies and other issues of direct or indirect relevance with regional or global implications for cereals. The series was first launched in 1990-91 in response to the considerable interest in developments in cereal policies and their implications at both the national and international level. In particular, we hope that the information provided will be of use to policy makers, researchers and others concerned with the more general issues of agricultural development and food security.

The first chapter of this *Review* consists of a survey of developments in national cereal policies during the past year, based on information available to FAO. The discussion is organised under various sections, each examining the main change in policies affecting production, consumption, marketing and stocking, and trade. The information was collected from a variety of sources; including FAO policy questionnaires, news agencies, the Internet, government and FAO reports.

The second chapter examines the issues arising from the implementation of the Uruguay Round Agreement as well as those emerging for the next round of trade negotiations on agriculture from the perspective of the developing countries. In Chapter 3, we present part of our contribution to the ongoing debate on biotechnology. Specifically, this chapter examines the issues and policy implications of developments in cereal biotechnology for the developing countries.

Comments and suggestions on this publication may be sent to: Chief, Basic Foodstuffs Service, Commodities and Trade Division, FAO Viale delle Terme di Caracalla, 00100 Rome, Italy. In addition, we can be reached by email at: esc-registry@fao.org or at http://www.fao.org/waicent/faoinfo/economic/comtrade.htm

H. de Haen

Officer-in-charge

Commodities and Trade Division

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1. REVIEW OF DEVELOPMENTS IN NATIONAL CEREAL POLICIES

1.1 Introduction

This Chapter brings together the main changes in national cereal policies which have emerged over the past year, base on information available to FAO. Each category of policy is presented separately, i.e. production; consumption; marketing and stocking; international trade and other agricultural policy programmes of relevance to the cereal sector with respect to domestic policy developments.

The trend in reducing the financial burden of consumer food subsidies continued during 1998/99 in a number of countries, especially those undergoing structural adjustment programmes. At the same time, and in part due to low cereal prices, new initiatives were undertaken by some countries to improve cereal productivity and to increase support to existing cereal production incentives. As regards international trade, slow cereal purchases prompted several large cereal exporting nations to provide more favourable conditions of sale, including the use of extended export credits and/or larger subsidies. Nevertheless, several countries initiated and strengthened institutional and other trade policy reforms not only to conform to the commitments made under the Uruguay Round Agreements (URA), but also to prepare for the next round of multilateral trade negotiations.

1.2 Production Policies

Overall, production support measures were strengthened in many countries, though, by and large, remaining within the URA commitments.

1.2.1 Africa

Several countries in the region made inroads in lessening direct state intervention in the cereal sector, mostly within the context of structural adjustment programmes. At the same time, concerns over increased dependence on imports encouraged some to re-design cereal production-enhancing measures. In **Algeria,** the Government increased the quantities of seeds and fertilizers freely distributed to cereal farmers by 66 percent. In addition, it provided up to US$123 million for pre-financing of inputs. These incentives were aimed at enabling farmers to improve yields especially in higher rainfall areas. In **Egypt**, to encourage farmers to sell their wheat crop to the Government, the guaranteed procurement price for the 1998/99 crop was raised to between US$190-200 per tonne, depending on quality.

Following the liberalisation of the rice sector in 1994, Government assistance in **Côte d'Ivoire** is now mainly restricted to the rehabilitation of rice fields and irrigation infrastructure. Similarly, the rice sector in **Madagascar** has been largely de-regulated and support concentrates mostly on infrastructure development and extension. By contrast, **Ghana** is attempting to reverse a falling trend in rice production through the distribution of high yielding varieties and the provision of credit to producers. **Guinea** is also paying particular attention to sustaining rice output, especially through public investment in rural infrastructure and irrigation, credit and extension. **Mozambique** launched a programme in late 1998 to foster the

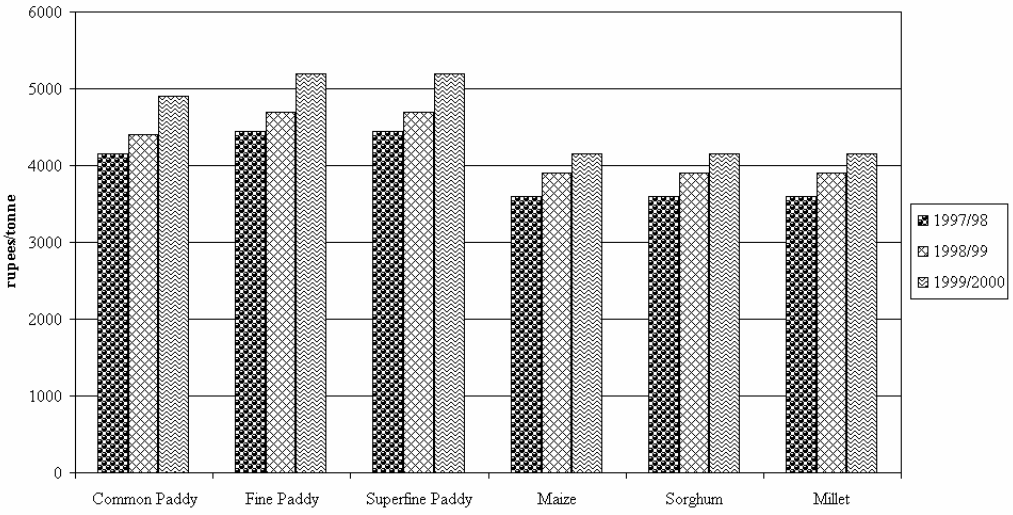
development of rice production by promoting the use of fertilizer and quality seeds. Rehabilitation of irrigation infrastructure and improved access to credits were provided to sustain output expansion. In early 1999, the Government of **Zimbabwe** increased its minimum guaranteed (floor price) for maize by 75 percent. This price increase was aimed at boosting incomes of small-scale farmers and at stimulating maize production.

1.2.2 Asia

Rice support prices in **Bangladesh** were maintained in real terms but trade in basic inputs, in particular fertilizers, was liberalized. Following the heavy floods in 1998/99, a rehabilitation programme was launched that included the distribution of basic inputs and subsidized credits. Although the Government continues to be committed to a rice area reduction programme, there has been little land diversion out of rice in the last ten years. Instead, the cropping patterns have shifted towards irrigated rice, mostly at the expense of the predominant *rainfed Aus* crop. In **China,** where reforms of its cereal sector is on-going (see Box 3), average procurement prices for wheat in 1998/99 where reduced by 4 percent to US$ 170 from US$184 per tonne in 1997/98. For maize the average decline was about 7 percent.

In **India,** support prices for cereals were raised for the 1998/99 marketing year (Oct/Sept). The announced Minimum Support Price (MSP) for paddy (common, fine and superfine varieties) reflected an increase of about 500 rupees (US$ 12) between 1998/99 and 1999/2000. For maize, sorghum, and millet, the MSP where increased by 6.4 percent to 4 150 rupees (US$97) per tonne. Figure 1 shows the levels of MSP between 1997/98 to 1999/2000 for the major cereals.

Figure 1: India's Cereal Support Prices, 1997/88-1999/2000



Source:USDA Attache, GAIN Report #IN9060

In the **Islamic Republic of Iran,** guaranteed procurement prices for wheat, barley, maize and rice were increased by 12 percent in 1998/99 over the previous

season's. Input prices, excluding electricity and pesticides, were also significantly raised.

In May 1999, the Government of **Japan**, in response to reports that pollen from maize containing *Bacillus thuringiensis* (Bt) could be harmful to the larvae of monarch butterflies suspended its approval of all genetically modified crops containing Bt for commercial sowing. In June, the Government reduced the producer and wholesale prices for wheat and rice in an effort to check the rise in stocks. Under the Country's Land Diversion Programme, targeted land diversion from rice to other crops remained fixed at 960 000 hectares for the 1999/2000 season, unchanged from the previous year. Japan is also currently encouraging the consolidation of paddy fields to enhance the sector's competitiveness.

In the **Republic of Korea**, paddy support prices were increased for the 1998/99 season but prices in real terms remained below the pre-URA level. In fact, the ability of the Government to provide price incentives to rice producers has been constrained since 1995 by its URA obligation to reduce the Aggregate Measure of Support to Agriculture, of which some 93 percent is accounted for by rice. Consequently, as the country continues to be committed to rice self-sufficiency, the Government has shifted to "green box" policies to support the development of high yielding hybrid varieties.

In **Malaysia,** where producer support prices have been stable in real terms, a free fertilizer distribution programme to paddy producers continues to be in operation despite its high budgetary costs. Moreover, the country is reportedly considering raising its rice self-sufficiency target from 65 percent to 72 percent by 2010.

In **Pakistan**, rice support prices were raised by 7 percent to 7 579 taka (US$164) per tonne in September 1998, but direct public intervention continued to be scaled down, as the Government progressively withdrew from providing marketing support while stepping up the provision of subsidized credit to small farmers and fostering hybrid rice cultivation. In the **Philippines**, the levels of cereal support prices were increased by 25 percent in 1999. The Country's "Golden Harvest" programmes, which aim at bolstering rice and maize production by providing technical support and credit to the private sector, were extended to include the issuance of interim guidelines on land use conversion to foster rice cultivation on irrigated and other prime land and to prevent the diversion of areas under rice to other uses.

In **Sri Lanka**, paddy support prices were raised by 20 percent in early 1999 to boost rice production. In **Thailand**, the target price used by the Government to support the rice farm price was increased by 5 percent in 1998/99. Financial incentives were also provided through the Paddy Mortgage Programme, which allows farmers to borrow against their future rice harvests at 95 percent of the target price and pay 3 percent interest on the loan.

1.2.3 Latin America and the Caribbean

In **Latin America and the Caribbean**, there was also a general tendency to move towards more liberalized domestic market systems. **Costa Rica** continued to increase support prices to cereal producers during 1998/99, although these were insufficient to provide real incentives to farmers. Nonetheless production has trended upwards in recent years, sustained by an expansion in irrigation. In **Mexico**, under its "Alianza para el Campo" programme (PROCAMPO), cereal producers have had access to various schemes in support of mechanization, fertilizer use and irrigation. In addition, a "one-to-one kilo swap" incentive was provided to exchange traditional with improved cereal seeds. Under Procampo, cereal producers are also eligible for per hectare cash payments. In 1999, the payments averaged about US$75 per hectare for cereals. Further support was provided through marketing subsidies, which were raised in 1998/99 to 150 pesos (US$9) per tonne, twice the level applied from 1994 to 1997. In **Guyana** and **Suriname** efforts were focused on the consolidation of rice production units and on the rehabilitation of basic infrastructure as the Governments have withdrawn from direct intervention in production and marketing.

In January 1999, the Government of **Trinidad and Tobago** introduced a revision to its Incentive Programme for Agriculture, which included revised subsidy payments and guaranteed prices for the first time since 1985. Prior to 1999, guaranteed prices were offered only for paddy, based on the grading system. The revised programme provides guaranteed prices for rice but, and for the first time, for maize as well. A subsidy scheme was also put in place for water in agricultural activities. The total cost to the Government of this revised programme amounts to about US$2.1 million. Technical assistance is also provided to farmers to enhance production of rice seeds and support the establishment of farmers' co-operatives.

1.2.4 Europe

The Government of **Estonia** changed its fuel tax compensation scheme in 1999, from one based on the proportion of land use to another based on actual fuel use receipts. A subsidy was also approved in the State's 1999/2000 budget for encouraging the use of high yielding cereal seeds, and the land tax for smallholders was reduced by 50 percent. The country's investment support scheme was also expanded with the provision of up to 73 million kroons (US$4.8 million) in subsidies to induce farmers to make new investments in agricultural infrastructure and equipment. Moreover, a *direct payment scheme*, introduced in 1998, was expanded in 1999 to subsidize cereals and other crop plantings. Under this scheme, the minimum eligible area was set at 5 hectares, containing less than 15 percent weeds. The average subsidy amounted to about 495 kroons (US$34) per hectare, depending on crop quality. An agricultural insurance programme was also initiated in 1999 to cover 40 percent of field crops.

In the **European Community,** an agreement was reached in March 1999, on the final package of reform of its Common Agricultural Policy (CAP)[1]. The main reforms for cereals are given in Box 1.

[1] See *Cereal Policies Review, 1995-97* for the background and initial proposals.

Box 1: Main Highlights of the CAP reform for Cereals

Intervention price
This will be reduced by 15 percent in two equal steps (7.5 percent cut in each phase); from €119.17 (US$125) currently to €110.23 (US$116) in 2000/01; and to €101.29 (US$106) in 2001/02. Cuts from 2002/2003 onwards will depend on market developments.

Set-aside
The base rate for the compulsory set-aside is fixed at 10 percent for the marketing years 2000/01 to 2006/07. For Portugal, the Maximum Guaranteed Area (MGA) payment was increased to 118 hectares. Also, the base area for the new German States was increased by 150 000 hectares. If the total area exceeds the MGA, payments will be reduced in line with the percentage overshoot of the MGA.

Direct payments
Area payments will be based on cereal reference yields, as determined by the Member States. To partially compensate for the lower intervention price, the direct payments will rise from the current €54 (US$57) per tonne to €63 (US$66) over two years. Finland and Sweden will receive additional compensation of €19 (US$19) per tonne to offset drying costs for both cereals and oilseeds.

Export tax
The Commission's right to apply export taxes to cereals will be restricted to a safeguard measure in extreme cases.

Sources: "The CAP reform - A Policy for the future", European Commission Directorate-General of Agriculture, 1999, and EC Regulation No. 1251/99 and No. 1253/99. Euro/US dollar exchange rates are those of March 1999 obtained from IMF, IFS, August 1999.

In **Hungary,** the Government replaced its system of price guarantees to cereal producers with a new pricing scheme in early 1999. The new policy establishes minimum and maximum levels for producer prices beyond which the Government would consider intervening in the market. The levels of administered farm prices were raised in **Latvia** for wheat and rye, depending on quality. In addition, the National Subsidy Programme, which became effective in January 1999, provided partial funding for agricultural activities geared toward modernising the country's agricultural infrastructure and promoting the use of certified seeds and crop insurance for risks related to weather.

In **Poland**, wheat and rye intervention prices could be set up to 20 percent above the minimum support prices, depending on the market situation. In late 1998, the Government equalised both sets of prices for the first time since 1992 in order to curb inflation. To achieve this price parity, the minimum prices of wheat and rye were increased by 11 and 13 percent, respectively, while intervention prices were reduced by 4 percent for wheat and 3 percent for rye relative to those in the previous season. Also, as a result of the tight fiscal situation, the Government during the 1998/99 season reduced its subsidy on seeding materials and fertilisers by about one-fourth. In addition, as a part of its strategy to align its domestic policies with those of the EC, plans were introduced in early 1999 for new production limits for cereals and other agricultural products. These actions are expected to aid the Government in regulating its financial support to agriculture. It would apply only to farmers who produce solely for commercial purposes.

In the **Commonwealth of Independent States**, the **Russian Federation**, in March 1999, passed a decree authorising the provision of fuel to producers to meet spring planting requirements. By June, up to 1.23 million tonnes of diesel fuel and 570 000 tonnes of gasoline had been supplied. The cost was shared between the Federal Government and relevant regional authorities. The Government also gave farmers the right to apply for land mortgages from the State. Under this arrangement, farmers are allowed to mortgage up to 50 percent of their land, but failure to pay off the mortgage will lead to land forfeitures to the Government.

Furthermore, the large price disparity between agriculture and other industries also prompted the State Duma to pass legislation which came into effect in August 1999, allowing the ministries of agriculture, finance and economics to regulate farm prices jointly. Under this new mandate, the Government forgave all farm debts that had been accumulated prior to June 1999 and provided a 50 percent subsidy to farmers for purchasing natural gas, fuel and electricity. Guaranteed procurement prices for various categories of cereals set under this coordination scheme are presented in Table 1.

Table 1: Russia's Guaranteed Procurement Prices for Cereals, 1999/2000

Commodity	Category	Rubles/tonne	US Dollars/tonne
Durum wheat	3	2 000	82
Soft wheat	3	1 700	70
Rye	3	1 200	49
Millet	2	1 000	41
Buckwheat	3	3 000	123
Brewers' barley	2	1 500	66
Rice	3	3 500	144
Oats	3	1 000	41
Maize	2	1 500	66

Note: Prices are exclusive of VAT.
Source: Ministry of Agriculture, Russian Federation

In early 1999, **Ukraine** provided credits worth about US$25.4 million to assist producers in the purchase of essential crop inputs and harvesting equipment. An additional US$13 million has been allocated to cover purchases of spare parts. These credits must be repaid by 1 December 1999.

1.2.5 North America

As a result of excessive rainfall in parts of **Canada**, which limited plantings to some 1.2 million hectares during the 1998/99 season, producers affected will receive an aid payment of up to C$50 (US$34) per hectare. In addition, a basic crop insurance programme will also contribute C$62 (US$42) per unseeded hectare, as well as to those farmers who planted less than 95 percent of their normal acreage. The total package, which amounts to about US$1 billion, includes direct payments to farmers who have incurred losses as a result of depressed world market prices. The Federal and Provincial Governments would share the cost on a 60:40 percent basis, respectively.

In March 1999, the **United States Department of Agriculture (USDA)** announced loan rates for the 1999/2000 crops. While the rates for most cereals remain unchanged from the previous season, the loan rates for barley and oats were increased to their maximum levels as established by the Federal Agricultural Improvement and Reform (FAIR) Act of 1996[2]. Loan rates for wheat, rice, maize and sorghum were left unchanged to avoid weakening the price safety net for producers.

1.3 Consumption Policies

The dominant trend in consumption policies over the past year was one of reducing government expenditures and, yet continuing to protect consumers.

In **Asia**, the volume of food distributed at subsidized prices in **Bangladesh** and the **Islamic Republic of Iran** was increased in early 1999. By contrast, **Myanmar** reduced the quantity of rice distributed at subsidized prices to Government employees by 200 000 tonnes. **Malaysia** extended retail price controls on local super grade rice, while in **Samoa** and **Syria** consumer price controls for rice were maintained. **India** increased its issue price for wheat and rice to the subsidized Public Distribution System (PDS) by 29 percent in early 1999. The hike was aimed at containing India's food subsidy expenditure, which exceeded budgeted levels by up to 15 percent in fiscal year 1998/99. Additionally, the ban on cross-state movement of wheat and wheat products procured through the open market scheme was lifted to reduce stocks held in several regions. **Indonesia** removed its 10 percent value-added tax (VAT) on feed and feed ingredients to help revive its poultry industry. As part of a reform package agreed with the World Bank in 1999, **Pakistan** phased out its subsidy on wheat flour. Private millers, however, received a boost through favourable exchange rates and the low prices of imported wheat.

In **Yemen**, where an IMF reform programme is ongoing, the Government abolished subsidies on wheat and flour in early 1999. However, to cushion the impact of the subsidy removal on consumers, the price of bread was fixed at the same level as before with stiff penalties in case of violations.

In Latin America and the Caribbean, the Government of **Brazil** reinstated the *Premio de Escoamento da Producão* (PEP)[3] for three months starting in September 1998, to support the domestic wheat market. Under this programme, the Government does not purchase any of the cereal, but intervenes by providing a subsidy to cover any difference (margin) between the bid price and the guaranteed minimum price. **Costa Rica** allowed a 7 percent rise in the regulated consumer price of rice in early 1999, but at the same time authorised large imports at preferential rates. In **Mexico**, the Government ended its subsidy on *tortillas* in January 1999. The Government and the *tortilla* industry reached an agreement to cap retail price increases at around 47 US cents per kilogram, to avoid excessive price gouging.

In **Europe**, the **European Commission**, imposed an EC-wide ban in May 1999 on Bt maize and, subsequently, on all new products containing genetically

[2] See *Cereal Policies Review, 1995-97, Chapter 3.*
[3] See *Cereal Policies Review, 1995-97* for more detailed description of this programme.

modified organisms (GMOs). The ban will be in place until the Commission establishes a new regulation on the use of GMOs.

In **Poland**, concerns over imports of lower priced cereals from the EC, combined with an effort to boost the agricultural sector from depressed prices, led the Government to provide subsidies to producers of wheat and rye. The subsidy amount was 60 zlotys (US$17) per tonne for rye and 90 (US$26) zlotys per tonne for wheat. Along with the new direct subsidy, farmers will also receive a guaranteed price of US$128 per tonne for food-grade wheat. In early 1999, **Norway** increased its wheat flour subsidy paid to the milling industry by 8 percent, which is granted on the basis of flour produced. In March 1999, the Government of **Switzerland** also banned the use of genetically engineered maize, using the same argument put forward by Japan and the EC.

1.4 Marketing and Stocking Policies

During the 1998/99 marketing season, several countries took steps to reduce market distortions induced by domestic policies., In some other countries, fiscal expenditures were reduced and redirected away from price support measures to direct payments. However, in countries where the effects of the economic crisis were severe, domestic market support policies were strengthened.

In **Asia**, following three successive bumper harvests between 1995/96 and 1997/98, **China** took significant measures to counter the fall in cereal producer prices, under the "Governors' Cereal Bag Responsibility System". In June 1998, a set of new reforms was enacted; the main features of which are presented in Box 3. Further changes were implemented in May 1999 with the introduction of differentiated prices for low and high quality cereals. In contrast to the 1998 reform, the new changes permit traders to buy cereals directly from farmers.

Box 3: Main Features of China's Cereal Sector Reform

Separation between the commercial and strategic functions of the Cereal Bureaus

Previously, the Cereal Bureau operated a combination of businesses like flour mills, hotels and restaurants and were responsible for the debts of all these entities, which were covered by loans provided through the central Government. In most cases, these funds were mixed with others destined for the management of the strategic reserves and, as a result, it was difficult to identify the entities that were operating at a loss. Under the new policy, the central Government will only be responsible for funds related to cereal storage and distribution activities of it's the Bureau.

Separation of Government-owned from commercial stocks

In the past, poor monitoring of cereal stock releases had weakened the central Governments' ability to stabilise prices. The new reform calls for a distinction between stocks owned by the central Government for strategic reasons and those held by local Governments for short-term commercial objectives.

Clear distinction in the respective responsibilities of the central and local governments.

The central Government will be responsible for setting domestic food security policies, overseeing the national cereal supply situation and stocks, and regulating domestic prices and international trade. The local governments, through their various Cereal Bureaus and with consideration given to national policy objectives, will be responsible for cereal marketing and provincial price stabilisation, more in line with the G*overnors' Cereal Bag Responsibility System.*

Debt relief to local Cereal Bureaus

Most of the local Cereal Bureaus have accumulated huge debts, which they argue is the result of earlier policies that mandated them to buy cereals from farmers at supported prices, much of which are still held in stocks resulting in debt overhang. Under the new reform, the central Government will be responsible for the interest on past debt while the bureaus will be responsible for the principal. The local bureaus will however be responsible for both the principal and interest on all new debts.

In April 1999, the Government of **India** increased the price of wheat sold from public stocks to between US$161 -175 per tonne. The Food Corporation was instructed to release 1 million tonnes of wheat for direct sale to millers at the revised prices, which vary according to region. In April 1999, the Government rescinded its control over the setting of the maximum retail prices (MRP) for fertilizers in a move aimed at reducing its domestic subsidy outlay. The fertilizer industry and importers will now be responsible for setting the MRP.

In **Indonesia**, the Government disbanded its state-purchasing agency (BULOG) in September 1999, paving the way for complete liberalization of its cereal sector. This process was initiated in 1998 with the liberalization of wheat trade[4].

The Government of **Japan** slightly reduced its procurement price for wheat and barley harvested in 1999 following an earlier reduction in November 1998 of about 2 percent. After the announcement of its "New Wheat and Barley Policies", in May 1998, the Government withdrew from marketing domestically produced wheat and barley. Under the new policy regime, a private marketing system will be introduced in 2000. The Government also launched a new compensation programme for domestic wheat farmers and the Simultaneous Buy and Sell (SBS) system for

[4] See *Cereal Policies Review, 1997-98* for more details.

imported wheat and barley for the feed sector. In the SBS system, buyers and sellers can negotiate directly to determine the quantity, quality and delivery date.

In early 1999, insecurity about its domestic food availability prompted the **Philippines** Government, through its National Food Authority (NFA), to take measures to avert potential food shortages. These measures included the granting of licenses to private firms to import rice and a barter deal with Vietnam involving fertilizer for rice. In **Myanmar**, the tender system for paddy procurement introduced in 1997/98 was replaced with a system of direct buying in which the procurement prices are based on the socio-economic status of the different state divisions. In early 1999, the Government of **Thailand**, in a bid to support depressed domestic rice prices, provided 3.5 billion Baht (US$ 95.6 million) to finance rice purchase of about 30 000 tonnes from its domestic market in several phases and to subsidize storage costs. Similar measures were taken in 1999 in **Vietnam**, where rice exporters were urged to anticipate paddy purchases, with the Government covering the associated storage costs.

In **Latin America and the Caribbean**, the Government of **Argentina** eliminated a 27 percent sale and profit tax on foreign commodity trading firms in early 1999. This was done to increase traded volume in futures exchanges and strengthen participation of foreign firms on the local market.

In **Brazil**, where the financial crisis was felt most strongly among Latin American countries, the Government decided in early 1999 to sell its entire stock of cereals to prevent excessive price hikes. This move was timed to coincide with the devaluation of the Real, national currency. In **Colombia,** the Government subsidized the storage of domestically produced rice by millers to encourage early rice procurement from farmers.

In **Oceania**, the Government of **Australia** announced in 1999 plans to revoke its guarantee on borrowings to fund pool harvest payments (PHP) to producers. This function will become the responsibility of the Australian Wheat Board (AWB Ltd). The PHP is an advance payment before the crop is sold. Producers will continue to receive a guaranteed 80 percent harvest payment within twenty-one days of delivery of their cereal to AWB Ltd. To fund the PHP, AWB will charge growers a fee and the PHP will be provided in the form of a loan, which will be repaid automatically by AWB through pool sales revenue.

In **Europe**, the Government of **Bulgaria** removed all remaining price controls on its domestic cereal markets in August 1998, thus effectively allowing domestic prices to move in line with world market prices.

In June 1999, the **European Commission** proposed changes to its feed industry regulations as a result of food contamination within the Community. If approved, the new regulations would tighten labelling requirements, restrict certain ingredients and strengthen the code of conduct in the industry.

To improve its cereal-marketing situation, the Government of **Lithuania** passed legislation in November 1998 for the establishment of a market regulation agency. This agency will be responsible for making advance payments for cereals,

price pooling, storage, trade and market stablilization. **Romania** increased its expenditure on agriculture by about 30 percent, with over half of the increase allotted to an input voucher scheme introduced in the previous season. Credit worth about US$3.3 million was provided to the National Agency for Agricultural Products to cover purchases of 100 000 tonnes of milling quality wheat directly from producers.

In **Slovenia**, the Government put forward its 1999-2000 agricultural policy reform programme in late 1998. The new policy addresses issues such as low productivity and incomes, loss of farmland, international competitiveness and the adjustment of domestic policies to those of the EC. The main aspects of this reform, with direct implications for the cereal sector, include: the dismantling of the state monopoly in the cereal and products markets; the establishment of an intervention mechanism in line with that in the CAP; and a decoupling of per hectare payments consistent with the EC's environmental and area support programmes.

As part of an agreement between the **Ukrainian** Government and the IMF, a decree was passed in February 1999, to transform the State cereal agency into an open joint stock company, that would continue to administer the strategic cereal reserves of the State, but would no longer be responsible for providing inputs to farmers. Previously inputs were provided to farmers on credit against their crops.

1.5 International Trade Policies

Sluggish trade during the 1998/99 marketing year prompted several large cereal exporters to provide favourable conditions to cereal importing nations to maintain their market shares. Extended export credits and export subsidies were granted by some major exporters to help promote sales, especially to Asia. In central and Eastern Europe, especially countries seeking to join the European Community, international trade policies were adjusted to conform to those of the Community.

1.5.1 Trade Regulations Affecting Imports and Market Access

In **Africa, Egypt**, the leading cereal importer, reduced import duties by 5-10 percent. However, to contain import growth and boost its foreign currency reserve, cereal importers were required to provide up to 20 percent cash deposits before letters of credit could be opened by commercial banks. The existing rice import ban was lifted in early 1999 for paddy and white rice, after a shortage at the start of the year. In response to health threats, cereal products from the EC containing milk or egg products were banned in June 1999.

In **Kenya**, the Government reduced the import duty on maize from 32.5 to 25 percent in July 1999 to encourage imports in the face of severe domestic shortage resulting from bad weather. The State's National Cereals and Produce Board had already set aside funds to purchase maize and other products to boost its stocks, which were drawn down to less than a third of its normal volume by late 1998.

In late 1998, **Morocco** revised the duties and threshold prices in its tariff regime[5] in response to the situation in the international cereal market at that time. Specifically, threshold prices where lowered for all imported cereals but the duty, which is applied to the difference between the threshold and CIF prices, was increased for most cereals except for durum wheat.

In January 1999, **Nigeria** doubled its wheat import tariff to 15 percent to protect domestic production. At the same time, it replaced the previous pre-shipment inspection requirements for all commodities with destination inspection in compliance with its WTO obligations. Though the import duty on rice remained at 50 percent, the ban on sorghum imports was lifted. In other actions, the 25 percent tariff rebate introduced in 1995 for a broad range of commodities was abolished.

In the **Republic of South Africa**, a new tariff regime for wheat[6] was implemented in April 1999. Under this new tariff regime, the long-term average US Hard Red Winter No 2 Gulf price f.o.b. is used as the basis to calculate the domestic reference price. When the difference between the domestic reference price and the world market price (US Gulf price) is greater than US$10 per tonne for three consecutive weeks, the tariff is raised. The new tariff increased from 181 rand (US$29) to 269 rand (US$42) per tonne in June 1999, to reflect a drop in the international wheat price. The wheat flour tariff was also increased to 750 rand (US$120) per tonne at the same time.

In **Asia**, faced with domestic supply shortages, **Bangladesh** temporarily abolished all taxes on rice imports, including a 2.5 percent development surcharge in February 1999. Also, in early 1999, **China** agreed to lower tariffs, lift import restrictions and raise its quota limits on a wide range of agricultural products, including cereals, in its bid to join the WTO. Furthermore, under a trade accord with the United States, signed in April 1999, China agreed to lift its 26-year import ban for cereals originating from the US Pacific Northwestern region, which previously it contended did not meet its sanitary requirements.

In August 1998, **India** allowed the importation of wheat under an open general licensing in an effort to check soaring prices. Moreover, in April 1999, the Government amended its trade policy regime to bring India further in line with WTO disciplines. For cereals, the amendments eliminated the import-licensing requirements. In **Indonesia,** due to an expected higher local rice harvest, the Government imposed a ban on all rice imports between March and May 1999, and allocated about US$10 million to purchase unhusked rice from domestic farmers. In early 1999, the **Islamic Republic of Iran** lifted its ban on imports of *packed* maize.

Under the Special Treatment Provisions on market access of the URA[7], **Japan** deferred the tariffication of rice trade barriers and granted duty free minimum market access equivalent to 4 percent of consumption in 1995/96, rising gradually to 8 percent in 2001/2002. However, in April 1999 the country abolished rice import permits, opted for tariffication and imposed a uniform specific tariff of 351.17 yen

[5] See *Cereal Policies Review, 1995-97* for details about the tariff system.
[6] See earlier issues of this publication concerning South Africa's previous wheat policies.
[7] Under Article 4, para.2, and Annex 5, section A, on Special Treatment of the URA.

per kilogram (about US$ 300 per tonne) on imports exceeding the minimum market access (MMA) in 1999 (Box 2).

Box 2: Japan's Rice Trade Policy

The Japanese rice import bans which were in place prior to the Uruguay Round Agreement in 1995, rested on two arguments. Firstly, in 1955, when Japan joined the GATT, the ban was justified under the *Balance of Payments* clause that granted such concession to countries facing severe deficit in their trade balance. Secondly, during the early 1960s, when the trade balance went from deficit to surplus, the Government contended that the import ban was necessary for food security and environmental reasons as rice cultivation is considered as a defence against flooding as well as a water filtration system. However, in 1972 some rice imports were allowed under a quota system that was used mainly in the brewing industry. During the URA, Japan used the Special Treatment provision with respect to Paragraph 2, Article 4 of the Agreement on Agriculture and postponed the tariffication of it rice sector.

Under the minimum access commitment of the URA, Japan agreed to allow imports in the first year of its tariffication equal to 4 percent of its average annual consumption in the URA base period, 1986-88. This will then be followed by equal annual increments of 0.8 percent of base period consumption until it reached 8 percent in the final year. Rice imports within this minimum access quota faced zero tariff, though the URA allowed Japan to add a mark-up of up to 292 yen per kilogram (US$2.56). This regime continued until April 1999 when a new regime was enacted.

The main changes under this new regime are on the over-quota rice imports for which the Government has set tariff rates of 351.17 yen (US$3.1) per kilogram in 1999 and 341 yen (US$2.98) per kilogram in 2000. This new policy also entails a reduction in the imported rice volume within its minimum access commitment from the original level of 682 000 tonnes (in milled rice equivalent) in 1999 and 758 000 tonnes in 2000, to 644 000 tonnes in 1999 and 682 000 tonnes in 2000.

In early 1999, **Pakistan** imposed an indefinite ban on imports of wheat by the private sector. The duration of the ban would be determined once the result of the 1999 harvest is known.

Under the provision for Special Treatment on Market Access of the URA, the **Philippines** expanded the MMA for rice from 59 000 tonnes in 1995/96 to 69 000 tonnes in 1998/99. Imports under this expanded MMA volume are subject to a 50 percent duty. In addition, to avert the flood of cheap imported flour, the Government reduced the import duty on wheat for processing into flour from 10 to 3 percent, which should remain in force until the year 2000. The tariff on wheat of feed quality was reduced to 20 percent from 35 percent, with a 10 percent target by 2000. By contrast, the import duty on wheat flour was retained at 10 percent in 1998/99, but is scheduled to be reduced to 7 percent in 2000. Under the WTO minimum access provision, **Thailand** committed to establish minimum import quotas for rice on the order of 243 000 tonnes, but there was little interest by traders in fulfilling them. By contrast, the **Republic of Korea**, through its state trading enterprise, has met its MMA provisions of 90 000 tonnes of rice for 1998/99. **Sri Lanka** re-imposed a 35 percent duty on rice imports in early 1999, which had been lifted in 1997.

Vietnam, facing an increase in its domestic demand for bread but at the same time trying to promote domestic processing of wheat into flour, in January 1999 doubled its tariff on imported flour to 20 percent while eliminating the 3 percent tariff on wheat. Private millers were also allowed to import bread wheat directly.

In mid 1999, following the removal of controls over wheat imports and its wheat flour subsidy, **Yemen**'s Ministry of Supply and Trade issued a decree providing for the immediate liberalization of imports of wheat flour. The Government will no longer be involved with the purchase, distribution and internal marketing of imported wheat and flour which is now the responsibility of the private sector.

In **Latin America and the Caribbean**, some member countries of the **Caricom** Agreement lowered their Common External Tariff on milled rice from 25 percent to 20 percent in 1998, with **Jamaica** applying an even lower duty of 15 percent. The rice import duty in **Trinidad and Tobago** remained unchanged at 25 percent. **Nicaragua** eliminated its price band system that had been in place since 1992 and replaced it with import duties of 25 percent in early 1999, with a further drop to 10 percent scheduled in 2001. In **Costa Rica**, the import duty on rice was raised from 20 percent to 35 percent on volumes exceeding its minimum access quota in 1999. At the same time, however, it authorized the import of some 60 000 tonnes at a reduced 10 percent duty, well in excess of its MMA commitments.

In late 1998, to cope with the huge export supplies but low import demand, resulting, in part, from the financial crisis in Asia, the **Mercosur** common external tariff was temporarily raised by 3 percent on most agricultural commodities. A compensatory levy of US$123 per tonne was also imposed on imports of wheat gluten from the EC to offset export subsidies granted in the Community.

Brazil reduced the tariff rate for milled rice from 21 percent to 15 percent in late 1998. In addition, it partially lifted an import ban that had been imposed on US hard red winter wheat since 1995. **Chile's** cereal imports, which are subject to a general duty rate, was scheduled to fall by one percent every year, from 11 percent in 1998 to 6 percent in 2003. Also in late-1998, **Ecuador** resorted to the special safeguard provision with respect to Article 5 of the Agreement on Agriculture (AoA) in addition to its price band system, which resulted in tariff rate increases of 26 percent and 20 percent for milled and paddy rice, respectively.

In **Europe**, at the end of 1998, a licensing procedure was introduced in **Estonia** for food importing firms to improve their transparency and guarantee consumer safety, following problems with certain food items imported from the EC. As a result of subsidised exports of wheat, flour and maize from Hungary, other members of the Central European Free Trade Association (CEFTA) imposed counter measures on cereal imports from Hungary, ranging from tariff increases to invoking the special safeguard clause under the URA. The rate of duty on cereal imports agreed to by members belonging to CEFTA ranges from 15 to 25 percent, though applied rates are sometimes lower[8]. The **Czech Republic** and **Slovakia** imposed an additional tariff of US$ 71 per tonne on wheat imports from Hungary, but lifted the import duty on feed wheat in late 1998 after an agreement was reached on tariff rate quotas on wheat imports. **Slovenia** also raised tariffs on wheat imports from Hungary to 15 percent from its previously applied rate of 4.9 percent. **Poland** increased its import tariffs on maize imported from Hungary to 20 percent and that on wheat to 70 percent while Romania invoked the special safeguard clause and subsequently raised import

[8] See *Cereal Policies Review, 1997-98* for details of this agreement, which came into effect in April 1998.

duties on wheat and flour from Hungary to 60 percent. On accession to the WTO in January 1999, **Latvia** raised its bound duty on barley and oats to 75 and 50 percent, respectively.

In late 1998, the **European Community** announced plans to add a new protein category for durum wheat in its tariff structure. The new wheat would be in the median range of its two currently existing wheat categories (high and low). This new category would carry a duty of around 45 euros (US$47) per tonne. In March 1999, as part of its agricultural sector reform programme (Agenda 2000), the EC reduced the tariff for imports of a limited amount of preferential maize for Spain and Portugal from non-EC nations to about 70 euros (US$74) per tonne. Furthermore, in June of the same year, it approved the renewal of a special concession on imports of some US-origin cereal. The measure permits imports of 50 000 tonnes of US malting barley annually at a lower import duty.

In **Oceania**, the Government of **New Zealand** announced in April 1999 that the import duty on cereals would be reduced to zero by 2002, except for wheat flour, which would carry a duty of 6 percent. Its WTO bound duty on wheat flour is about 21 percent.

In **North America**, the **United States** and **Canada**, reached an agreement in December 1998 to avert trade tensions between the two nations. Recently, trade tensions were sparked in part by low cereal prices and supply surplus in the United States coupled with increased imports from Canada as a result of a weakened Canadian dollar. Under the accord, Canada agreed to let US farmers export cereals to Canada more easily by rail, eliminate its testing requirements for a wheat disease (*karnal bunt*) and establish a new mechanism to monitor cereal exports to the United States with regular consultations.

Also, in mid-1999, amidst protest from the European Community, the United States reduced the size of the 1999/2000-import quota of wheat gluten from the EC. The quotas are established every three years to "safeguard" the US gluten industry. The quota reduction was enforced to account for above-quota imports from the EC during the previous year.

1.5.2 Trade Measures Influencing Exporters' Incentives and Exports

In **Asia**, the **Indian** Government, in June 1999 allowed wheat exports of up to one million tonnes during the current financial year (1999-2000) but rejected a request from the private sector for an export subsidy payment of about US$25. In addition, to stimulate milled rice exports, the Government passed a decree waiving all levies for exported milled rice. Under the decree, the Government reserves the right to reinstate the levies if shortages are envisaged in the Public Distribution System (PDS). Furthermore, the levy used to finance the Country's Basmati Rice Export Promotion Fund, set up in 1997, and was doubled in 1999.

In **Japan**, the Government, as of April 1999, abolished export permit requirements for rice. In **Vietnam**, where the Government regulates rice exports through the issuance of export quotas to licensed traders and guarantees minimum

export prices, imposed an export tax in early 1999 to limit the outflow of supplies to boost domestic availability.

In **Europe**, as a result of low world market prices and high transportation costs, **Hungary** subsidised wheat, flour and maize exports within limits agreed to by the WTO. This resulted in the curb on Hungarian exports by other members of the CEFTA, as indicated earlier. However, as of May 1999, only wheat flour exports were still supported. All export subsidies were terminated in August 1999.

1.5.3 Developments in Bilateral and Multilateral Trading Arrangements

The momentum created by the URA provided the impetus for countries to revise old trading regimes and enact new ones in line with the global thrust to liberalize agricultural trade.

In Eastern and Southern Africa, the Governments of **Kenya, Tanzania and Uganda** planned to sign a new treaty in late 1999, re-creating a common market including a customs and monetary union to replace the now defunct East African Community (EAC). Ideological differences and concerns that Kenyan goods were dominating trade led to the demise of the EAC. In July 1999, the **South Africa Development Community** (SADC) ratified a protocol liberalizing trade by abolishing tariffs in three phases. About 60 percent of all goods traded among member states will be duty free under the first phase, to commence on 1 January 2000. For the second phase to last until 2005, tariffs will be gradually reduced to zero. Cereal and other goods considered for the third phase are regarded as sensitive and their treatment will be subject to special consultations among the member states.

The **Republic of South Africa** and the **EC** signed a bilateral trade pact, to be effective on 1 January 2000. Trade in cereals and other sensitive agricultural products were not included in the deal. A similar agreement is also planned between the **EC** and the **Mercosur** States[9] by the end of 1999. Here, the parties have agreed to postpone talks on tariffs until July 2001.

In early 1999, the **US** Congress approved the "African Growth and Opportunity Act," which would extend duty-free treatment under the Generalized System of Preferences (GSP) and broaden the product coverage to include those currently excluded from GSP for beneficiary countries in sub-Saharan Africa that are eligible to participate. The current Act will expire in June 2009.

In January 1999, the current members of the **Association of South East Asian Nations** (ASEAN)[10] agreed to reduce 90 percent of some 45 000 import tariffs to minimum levels of between 0-5 percent ad valorem by 2000, in a bid to promote a free trade area initiative (AFTA). Under this new initiative, most members will reduce tariffs to a maximum rate of 5 percent by 2002, with Vietnam, Burma and Laos slated to achieve the same target between 2002 to 2006. In addition, the countries of Indonesia, Malaysia and Thailand proposed the establishment of a free trade '*halal*

[9] Mercosur Member States includes Argentina, Brazil, Uruguay and Paraguay as full Members and Chile and Bolivia as associates.
[10] The ASEAN members States are Brunei, Burma, Indonesia, Laos, Malaysia, the Philippines, Singapore and Thailand.

food centre' where foodstuffs will be prepared according to Islamic dietary rule and sold to Muslims shoppers around the world.

The Europe Agreement (EA), which came into force in February 1999, provided the legal basis for trade between the **EC** and **Slovenia** for the transition period before Slovenia becomes an EC member. Also, the EC is envisaging a "Stabilisation and Association Agreement" with **Albania, Bosnia, Croatia and** the **Yugoslav Republic of Macedonia**, which will provide funds for political and economic reform, and eventual EC membership.

1.6 Other Agricultural Policy Programmes and Initiatives

In mid 1999, the World Bank provided loans worth US$550 million to **Egypt** to finance six major projects, including irrigation stations that service wheat and rice production and to upgrade other of rural infrastructure. In addition, the Egyptian Ministry of Public Works and Water Resources embarked on a project to improve the efficiency of the agricultural drainage system.

In **China,** where excessive flooding along the Yangtze river has left several thousand causalities and over US$30 billion dollars in direct economic losses, the Government, in late 1998, allocated US$2.5 billion for flood prevention projects and imposed a ban on logging.

In February 1999, the **Indian** authorities unveiled the country's budget for the 1999/2000 fiscal year (April-March). Expenditure on agriculture was increased by 35 percent, but the allocation for the country's food subsidy programme was reduced slightly from that of the previous fiscal year. The increase in spending on agriculture would be geared towards enhancing food security with the creation of a subsidized watershed development programmes to cover up to 100 priority areas, improved rural credit and assistance to expand storage facilities. Moreover, the Governments' initiative was strengthened by the provision of about US$800 million through a joint programme co-sponsored by the United Nations Development Programme (UNDP) and the Food and Agriculture Organization (FAO). The UN assistance will help strengthen maize cropping systems in areas with poor irrigation infrastructure and fragmented smallholdings. In addition, to improve the value added on agricultural products, lower interest credits were provided for the agro-food sector.

In the **Islamic Republic of Iran**, where drought has resulted in huge losses to farmers, the Government, in June 1999, unveiled a plan to defer loan payments by farmers for one year and provided new credits with an increase in budgetary allocations to agriculture of about 3 percent.

In early 1999, **Japan** provided US$190 million in long-term concessional loans to **Vietnam** to enhance its progress toward trade and investment liberalization and the conversion of non-tariff barriers to tariffs.

In **Argentina,** where low international cereal prices and two consecutive years of flooding have caused hardships in the agricultural sector, the Government provided credit to farmers worth US$800 million, including refinancing of debt and tax

concessions. This was in addition to an emergency aid fund worth US$500 million dollars provided by international institutions. The Government of **Brazil**, still recovering from its financial crisis, announced that it would provide US$7.5 billion to aid farmers during the 1999/2000 season. This amount is about one-half of what it used to provide as farm support in the early 1990s. The Government is urging farmers to make use of risk management instruments such as the futures market.

In July 1999, the **European Commission** announced that the annual value of aid to finance agricultural reform in the 11 potential new EC members would amount to around €520 (US$544) million between 2000-2006. The allocation for each country would be calculated based on its agricultural population, arable land and percaput GDP. Before receiving the funds, each country would have to submit a plan detailing how it intends to harmonise its domestic farm policies with the Common Agricultural Policy (CAP). Starting in fiscal year 1999-2000, the EC would adopt a new food assistance strategy for Bangladesh, in which cash would be provided instead of food. During the past five years, over 30 million euros have been provided to Bangladesh as food aid.

Attempting to speed up adjustment in the agricultural sector and under pressure from domestic producers as a result of depressed prices, several central and eastern European countries provided new or expanded existing credit subsidies and investment guarantees during the 1998/99 period to cereal farmers. In December 1998, **Albania** approved a medium term agricultural development strategy geared toward integrating its agricultural policies with that of the EC and the WTO. Major elements in this plan include a framework for settling disputes related to land conflicts, and structural and institutional reform with emphasis on private sector initiatives. The programme would also seek to integrate remote rural areas, aid in the development of a high-valued agro-food sector and provide adequate protection through the application of import duties at a proposed level of 10-40 percent. Short-term preferential credits with end-of-season repayment dates where augmented in **Bulgaria,** the **Czech Republic, Estonia, Hungary, Lithuania and Slovakia**. Furthermore, in June 1999, Bulgaria signed a loan agreement with the World Bank worth €71.3 million (extended for 20 years with a 5 year grace period) to support reforms in its agricultural sector. **Estonia's** Rural Life Credit Foundation, which provides credit guarantees for cereal farmers with insufficient collateral, approved and guaranteed up to 80 projects. Also, new credit systems based on land market development and *warehouse receipts* were introduced in the cereal sectors of **Bulgaria, Hungary, Poland and Slovakia** to overcome the problem resulting from lack of loan collateral.

In **Poland**, the Government raised the upper limit on credits granted for purchases of agricultural inputs by farmers with less than 100 hectares and extended the repayment period to 20 months (from 12 months) on loans granted in the previous season. For cereal farmers with landholdings of over 100 hectares, credit limits remained the same but the interest rates were reduced by 28 percent with a 12-month repayment period. In **Romania,** the Government set up a special fund to provide both private and state-owned farms with short-term preferential credits for two years between 1998-2000. If the credits are paid on time, the beneficiaries would receive a

rebate of 70 percent of the interest. Also subsidised interest was provided on loans for purchases of agricultural equipment.

2. THE MILLENNIUM ROUND OF TRADE NEGOTIATIONS: AGRICULTURAL POLICY ISSUES FOR DEVELOPING COUNTRIES[11]

2.1 Introduction

The Uruguay Round (UR) Agreement on Agriculture (AoA) began a process of bringing the trade distorting agricultural policies of many countries under multilateral rules and disciplines[12]. In the developing countries, the common objectives of these reforms are geared toward enhancing productivity in sectors dealing basic food commodities and the quality of their products[13]. However, much remain to be done before developing countries can benefit significantly from the changing policy environment. For this reason, the next round of negotiations referred to here as the Millennium Round (MR) will have a direct bearing on agricultural development, trade and food security in the developing countries. Issues arising from the implementation of the UR agreements as well as those emerging for the MR negotiations on agriculture are outlined below from the perspective of the developing countries. These issues are addressed under three broad categories: those that relate to domestic support, market access and other relevant topics.

2.2 Issues Relating to Domestic Support

The policy flexibility of developing countries under the AoA can be defined in relation to four elements: reduction commitments on domestic support, exemptions under the *de minimis* threshold, special and differential treatment provisions (SDT), and "green box" policies. Most developing countries do not have reduction commitments on domestic support under the AoA because their support levels are typically lower than those provided by the developed countries. Under the *de minimis* provisions, developing countries may exclude from their calculation, and hence from their reduction commitments, support that would otherwise be subject to disciplines if such support constitute less than 10 percent of the value of production.[14] For product-specific programmes, the *de minimis* limit is based on production of the specified product, whereas for non-product-specific programmes, the limit refers to the value of total agricultural production.

[11] This article is based on *Paper No. 4: Issue at stake relating to agricultural development, trade and food security*, presented at the FAO symposium on Agriculture, Trade and Food Security: Issues and Options in the forthcoming WTO Negotiations from the Perspective of Developing Countries. Geneva, 23-24 September 1999.

[12] Other agreements with a specific bearing on agriculture include: the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), the Agreement on Technical Barriers to Trade (TBT); the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and the Decision on Measures Concerning the Possible Negative Effects of the Reform Programme on Least Developed Countries and Net Food-Importing Developing Countries.

[13] See FAO (1997), "National agricultural development strategies towards 2010," for a number of the LIFDCs.

[14] For developed countries the corresponding *de minimis* limit is 5 percent.

2.2.1 *Aggregate Measure of Support*

Some of the particular needs of developing countries in the area of domestic support are taken into account in the AoA provisions for SDT. Article 6 of the AoA excludes from the reduction commitment some support measures that are considered developmental. These are programmes designed to encourage agricultural and rural development and they are an integral part of the development programmes of developing countries. They include: investment subsidies which are generally available to agriculture in developing countries; agricultural input subsidies generally available to low-income or resource-poor producers in developing countries; and domestic support to producers in developing countries to encourage diversification from growing illicit narcotic crops.

Also exempt from reduction commitments, for all WTO members, are the "green box" policies outlined in Annex 2 of the AoA. These are policies that are considered to have no, or at most minimal, trade distorting effects or effects on production. The "green box" includes, general services to agriculture such as research and extension; public stockholding for food security purposes; structural adjustment programmes; environmental programmes[15]; crop and income insurance schemes; and certain direct payments and income supports that are not linked to agricultural production. "Green box" support must be provided through publicly funded government programmes (including government revenue foregone), and must neither involve transfers from consumers nor have the effect of providing price support to producers.

The overwhelming majority of the developing countries reported zero or less than *de minimis* total base aggregate measurement of support (AMS)[16]. Most of these countries, which represent about two thirds of the WTO membership, have no reduction commitments on domestic support but neither do they have WTO "rights" to use "amber box" support in excess of the *de minimis* level in the future. Although many of these countries are not currently constrained by the domestic support provisions of the AoA, they may find their policy options limited in the future. Only 20 developing countries (out of more than 100 countries) have reported positive total base AMS and, of these, only 12 reported total AMS in excess of the 10 percent *de minimis* allowance.

A second issue of concern for developing countries is related to the fact that product-specific support in most developing countries is devoted mainly to production of basic foodstuffs. On average, more than 70 percent of the current total AMS notified by developing countries during 1995 and 1996 was allocated to the production of cereals. For several countries, such support is near the allowed product-specific *de minimis* level. Thus, while the *de minimis* exemption is unused for many products in these countries, it may constrain their support of basic food production. Furthermore, the extent of flexibility in non-product specific support for developing countries may be inadequate.[17] Sector-wide support in areas such as agricultural

[15] It is important to note that in the context of the AoA, "green box" policies refer to a wide array of measures that are considered to have little effect on production and trade, and that are therefore permitted to continue. "Green box" policies are not necessarily environmentally "green". Considerable confusion can arise because environmentally "green" policies are included in the "green box" but the "green box" contains many other types of policy measures as well.

[16] WTO Secretariat Background Paper (AIE/S2/Rev. 1), May 1999

[17] FAO country case studies in both WTO members (e.g. India, Turkey and Bangladesh) and non-WTO members (e.g. Syria, Yemen and Sudan) have shown that the chances for expanding non-product-specific support under the AoA rules are much more limited than those for product-specific support.

credit, transport, irrigation and fuel are important aspects of the development strategies of many countries, and additional flexibility in their use may be needed.

Third, because the base year AMS is expressed in fixed nominal prices, several developing countries have difficulties remaining within their current allowed AMS levels due to high inflation and exchange rate depreciation, despite the fact that the real support to agriculture may not have increased. This is because these were years in which agricultural support in the developed countries was at its highest level over the preceding decade. Although the AoA recognizes the problem of excessive inflation and the need for giving it due consideration, the precise way to give such a "consideration" as well as the meaning of "excessive rates of inflation" are not spelled out. Some of these countries have therefore raised the issue of being allowed to maintain support levels in real terms[18].

The interpretation of certain other terms associated with domestic support may be an important issue for developing countries. In general, countries have not been consistent in their interpretation of the term 'eligible production': some used total production, others used marketed amounts and still others used the amount procured by a parastatal. As a result, the AMS and its respective *de minimis* levels may change considerably if a different interpretation is made on what production level to include in the calculation. Other problems have arisen regarding lack of clarity on the definition of *'low-income and resource poor farmers'*. Most of the developing countries have referred to the exemption of input subsidies for poor farmers and excluded almost all of their input subsidies, a practice that has been intensively questioned at the WTO. For many developing countries, input subsidies are an essential component of their broader agricultural development strategies and are used to facilitate the adoption of improved farming technologies.

A critical issue of concern to developing countries is the need for a more precise definition of policies that qualify for inclusion in the "green box". Although such policies are described as having, at most, only minimal distorting effects on production or trade, which may not be the case in the long run for many policies currently justified under the "green box". In view of the limited financial ability of many of the developing countries to provide such support, their expenditures remain insignificant compared with that of the developed countries.

2.2.2 *Tariffication*

In developing countries, it is sometimes necessary to maintain a degree of border protection in order to implement a domestic support policy. This is particularly true for an administered price support system. Where there are no such programmes, producer prices may still be supported through tariffs. In general, the bound tariffs of developing countries are sufficiently high to allow for a considerable degree of protection at the border.[19] However, there are issues in this area that need to be noted.

[18] To overcome this problem, some countries notified their current AMS in US dollars, at the same time revising the base AMS levels also in US$ terms, while others have adjusted their external reference prices to accommodate changes in exchange rates. However, these corrections have been questioned at the WTO.

[19] Although for several temperate-zone products, tariffs of developed countries are much higher than those of developing countries. For a complete list of the base and bound tariffs for cereals see FAO (1995), "Impact of the Uruguay Round on Agriculture," pp88-92.

First, most developing countries chose to offer a uniform single rate of binding for all agricultural products. With the tariffs now bound and facing further reductions in the MR round, an across-the-board reduction could leave little room to provide a degree of protection for sensitive sectors – this aspect needs to be taken into account in the choice of a reduction formula. Second, some countries have bound their tariffs at very low levels so that they now have little room to maneuver in the use of the tariff as a contingency measure against price fluctuations on world markets. Third, there are some anomalies in the schedule of bound tariffs in some developing countries. For example, for some products the bound rates are very low (even zero) while for other products – e.g. substitute commodities - they are very high, implying that the high bound rates have no practical significance.

2.2.3 *Export subsidies*

There are two main concerns regarding the export subsidy provisions of the AoA. One is that they legitimise the use of export subsidies in agriculture (such subsidies are prohibited for other goods), and the other is that they effectively favour exporters that used subsidies in the past (predominantly developed countries) while prohibiting others from using them. As it stands, only a small number of the developing countries have access to this provision, although developing countries are permitted to use subsidies for marketing, internal transport and freight costs. For a developing country, one of the main rationales for the use of trade policies is the need to support infant industries. Thus, in view of the severe supply bottlenecks and technological constraints in developing countries in the area of agricultural trade, export subsidy schemes could have relevance in some cases, as they would allow the targeting of incentives to specific, selected agro-industries. However, few developing countries have the financial resources necessary to use export subsidies as a market-development tool.

2.2.4 *Trade-Related Aspects of Intellectual Property Rights (TRIPs)*

The acquisition and adaptation of agricultural technology, particularly for production, is an issue of vital concern for developing countries. In the context of the TRIPs Agreement this relates notably to the requirement under the agreement, that countries provide for the protection of property rights to plant and animal varieties, either by patents or by effective *sui generis* legislation. The issue of the patentability of plant and animal varieties as well as those related to genetically modified organisms (GMOs) raise questions beyond the mere protection of intellectual property rights. These include issues concerning the rights of local communities and indigenous peoples, sovereign rights over natural genetic resources, biosafety and food security. Developing countries face two sets of difficulties in this area. On the one hand, most of them, particularly Least Developed Countries (LDCs), lack the scientific capability to innovate and patent new materials – a majority of them are not even in a position to fully catalogue the natural resources of biomaterials that they currently possess, nor do they have appropriate legislation in this area. On the other hand, there is a growing concentration of transnational companies in biotech industries, notably in the seed sector. This concentration or lack of competition in the industry (reinforced by global patentability) puts biotech firms in a position to exact monopoly-rents from farmers world-wide. In addition, aside from the issue of costs,

many countries feel insecure to rely entirely on external sources for inputs as strategically important as seeds.

The Agreement recognized these problems and addressed them through "special and differential" treatment provisions for developing countries. However, in the view of many developing countries, these provisions have not resulted in any concrete benefits in the implementation process, particularly regarding financial and technical assistance and access on favourable terms to new technologies.

2.3 Issues relating to market access

If developing countries are to fully develop the potential of their agricultural sectors they must also receive better access for their products in the major import markets, primarily in the developed countries of Europe, Japan and North America. In addition, improved access to the markets of the higher-income developing countries is also important.

2.3.1 Higher Tariffs and Tariff escalation

In principle, tariffication was meant to result in bound tariffs no more protective than the non-trade barriers that existed in the base period. And since all tariffs are being reduced, market access terms should have improved. However, a recent Organisation for Economic Co-operation and Development (OECD) study on border protection showed that actual border protection to agriculture was higher in 1996 compared to 1993 in eight of the 10 OECD countries (EC as one).[20] It was also found that tariff protection is substantially higher on food and beverages group compared to agriculture as a whole. The study used production-weighted averages of applied Most-Favoured Nation (MFN) tariffs, and since bound rates cannot be below the applied rates, border protection based on bound rates would be even higher.

The post-UR tariff profile of many developed countries is typically characterised by relatively high rates on temperate-zone food products and lower rates on tropical products. Tariff reductions were generally lower for temperate-zone products; cuts on tropical products averaged 43 percent, whereas cuts were lower for other product groups, the lowest being 26 percent for dairy products.[21] Developing countries as a whole have a high stake in the export of temperate-zone products, as these are also the products where the market is still expanding. High tariffs in agriculture are most common in three product groups: major food staples; fruit and vegetables; and the food industry (processed food products).

Tariff escalation refers to a situation where tariffs rise as the processing chain advances. This practice can result in significant effective protection to processed products, depending on the share of value added in the final output. Tariff escalation as a barrier to trade will matter more in the coming years as trade is rapidly shifting to

[20] OECD (1999), *Preliminary Report on Market Access Aspects of UR Implementation*, Document COM/AGR/APM/TD/WP (99) 50, June 1999, OECD, Paris.

[21] See WTO (1999), *Guide to the UR Agreements*, Kluwer Law International and WTO Secretariat, Table III.2. Although tariffs on tropical products were reduced the most, that was done on a very low base, e.g. 5 – 10 percent, which for trade can be much less effective than a 26 percent reduction on a very high base.

processed products. The developing countries have a strong interest on this matter as they are trying to escape from a dependency on producing and exporting primary products. As said above, the post-UR bound tariffs are relatively very high on processed foods. Several studies have shown that although tariff escalation was reduced post-UR, it still prevails in several important product chains

2.3.2 Tariff rate quotas

Tariff rate quotas (TRQs) were intended to ease the process of tariffication. Thirty-six WTO Members have tariff quota commitments in their Schedules with a total of 1,370 individual quotas on agriculture. The total volume of the TRQ in 1995 as a percentage of the world trade typically ranged between 3 to 7 percent. For some product groups, e.g. dairy, meat and sugar, this exceeds 10 percent.

While TRQs have potentially created some new trading opportunities, a number of conceptual and implementation issues have arisen, including: the lack of transparency in their administration (e.g. the many ways of administering TRQs not all of which provide effective market access); allocation to traditional (historical) suppliers and not on an MFN basis, and counting existing preferential access schemes as part of minimum access commitments;[22] counting allocations to non-WTO members; allocation to state-trading enterprises and producer organizations, etc. All of these have presented difficulties for new entrants. Also, the broad product classification for TRQs allowed under the UR has prevented opening up minimum access in some sub-products within this broad product category.[23] Finally, the setting of within-quota tariffs under the UR has been very uneven and, although many of the TRQs have been opened at low or zero tariffs, there are some cases where within-quota tariffs are so high that imports may not take place. All these problems have been responsible for an underutilisation of TRQs, although in some cases market conditions have also been identified as the main cause. The developing countries have a stake in reforming the TRQ system, but perhaps what is most important for them is ensuring that they have fair access.

2.3.3 Special safeguard (SSG) provisions

The special safeguard (SSG) provisions allow an importer to increase tariffs above bound levels in response to a surge in imports or a decline in import prices. Because the agricultural SSG measures were reserved for countries undertaking tariffication, most developing countries do not have access to SSG measures.[24] Close to 80 percent of the tariffied items of the OECD countries are subject to SSGs.[25] The right to have recourse to SSGs is more common in meat, cereals, fruit and vegetables, oilseeds and oil products and dairy products.

[22] See,Tangermann, S., *Implementation of the Uruguay Round Agreement by Major Developed Countries*, UNCTAD/ITD/16, Geneva, 1995.

[23] For instance, the EC, in its minimum access commitments, has aggregated all vegetables into one category and all fruit into another. As a result of this aggregation, the quantities of imports of the EC from each of the two categories during 1986-88 was more than 5 percent of its base year internal consumption and, as such, the minimum access commitment was not applicable. The situation could have been different if a product by product approach had been followed.

[24] By virtue of their tariffication, only 22 of the developing countries have reserved the right to invoke the special safeguard clause for some of their agricultural products. As at the end of May 1997, none of these countries, apart from the Republic of Korea, had invoked the SSG right they retained.

[25] UNCTAD (1995), *Identification of New Trading Opportunities Arising from the Implementation of the UR Agreements in Selected Sectors and Markets*, UNCTAD, Geneva.

Maintaining the SSG under present conditions (country and product eligibility) will perpetuate discrimination against those Members that do not have access to the SSG, largely developing countries. Thus, some suggestions have been made for the elimination of the SSG altogether, on grounds that Members can resort to the other WTO safeguards. However, the general WTO safeguards are not automatic. They require proof of "injury test", are costly and involve delays. Hence, in general, available WTO safeguards are not a viable option for many developing countries and for them the SSG option could be highly desirable but, preferably, be limited to a specified number of basic foodstuffs, i.e. those that are considered sensitive from domestic food security considerations, as discussed above.

2.3.4 Sanitary and Technical Barriers

The sanitary and photosanitary (SPS) and technical barriers to trade (TBT) agreements define rules for setting national standard and regulations relating to sanitary and phytosanitary measures as well as technical requirements for food safety and quality so that such regulations do not unduly restrict trade.

A major challenge faced by the developing countries is raising the SPS/TBT standards of their exports to at least internationally recognized levels. Although the gap in their ability to meet such standards is wide, the lack of compliance with standards has not been the only reason for the detention and rejection of food imports from the developing countries. The developing countries face additional challenge where countries, on risk assessment grounds, adopt higher standards than those currently recognized by international standard setting bodies. In addition, rising consumer concerns over food safety and quality compounds the difficulty of the developing countries in meeting ever-higher standards.

Many developing countries require assistance to meet these standards. One way is to strengthen the SPS/TBT Agreements, which contain promises of financial and technical assistance for the developing countries. In addition, some mechanism (e.g. an international ombudsman/arbitrator) may be required to minimize "trade harassment". Finally, limited participation of these countries, both in number and effectiveness, in international standard-setting bodies also continues to be an issue at stake.[26]

2.4 Other issues

2.4.1 *Agricultural market stability*

World agricultural market instability remains a major problem for LIFDCs because of their high dependence on world food markets and the weakness of their agricultural sectors. Thus, access of these countries to WTO-compatible safeguard measures remains an issue of great concern to them. Three possibilities may be considered for the developing countries. First, for basic foods, many developing countries favour having access to the SSG, which is simpler to use rather than the general GATT safeguard which is not easily applicable in practice. Second, price

[26] As a priority for more universal acceptance of its standards, the Codex Commission encourages greater developing country participation in its committees, but funding for such participation is very limited.

bands provide an appropriate and tested instrument for these countries to help protect the developing agricultural sectors.[27] It is however important to ensure that the scheme does not fully insulate domestic markets from movements in world prices. Also, the legality of a price band policy is not entirely clear – while applying a duty within the bound rate is permitted, the AoA prohibits "variable import duties". This is an issue on which developing countries could seek clarity in the next round. Third, risk management instruments is yet another option to hedge against market instability. Market-based instruments such as forward and futures price contracts and options are fully compatible with the WTO.

2.4.2 The Marrakech Decision

The implementation of the Marrakech *Decision* in favour of LDCs and NFIDCs is a matter of concern, particularly for these countries. To date, the *Decision* has not been activated, despite the fact that food aid has dropped and food import bills of LDCs and NFIDCs have risen. Implementation of the *Decision* has so far been hampered by several factors, including, *inter alia*: the requirement for providing an undisputed proof for the need for assistance and whether these needs resulted from the reform process under the UR; and, secondly, the variety of instruments called under the *Decision* to respond to such needs, without being too specific on the respective responsibilities of all concerned. The major problem related to the *Decision*, however, is that it addresses a transitional problem while in fact the food security problem in the countries concerned is long term and complex and encompasses broader development issues in addition to trade.

2.5 Conclusion

There are many issues at stake for developing countries in the forthcoming MR negotiations. If developing countries are to develop fully their agricultural potential, they need to rectify there past policy bias against agriculture as well as seek a reform of policies that distort world agricultural markets. While both sets of reforms are essential, in practice, their sequencing could be crucial as to whether the situation of the developing countries progressively improves or becomes worse. As was mentioned earlier, there is a substantial imbalance in the remaining levels of domestic support and export subsidies allowed to developed countries on the one hand, and developing countries on the other, under the AoA commitments. Given the “standstill and roll back” principle underlying the AoA, this implies that developed countries have WTO “rights” to use their remaining high levels of support and protection, while developing countries’ “rights” to similar support and protection are constrained to their considerably lower levels. The issue of concern is that, unless the levels of support and protection of the developed countries can be brought down quickly, the imbalance in support levels together with the constraints on developing countries’ policies could make their adjustment much slower and more difficult.

[27] That is, countries may vary their applied rates as long as they keep the maximum rate of duty at a level no higher than their bound rate of duty. In this way countries with fairly high bound tariffs may be able to offset variations in import prices by reducing tariffs when prices rise and raising them when prices fall.

3. CEREAL BIOTECHNOLOGY: ISSUES AND POLICY IMPLICATIONS FOR DEVELOPING COUNTRIES

3.1 Introduction

This chapter reviews the developments in cereal biotechnology and the salient issues facing developing countries, including the policy options for developing countries to benefit fully from the changing framework of global agricultural systems. An overwhelming portion of research on agricultural biotechnology in the developed countries has been on a very small number of specific crops. In the developing countries, biotechnolgy applications in varying degrees have been implemented in over 60 countries, though more intensive research has been concentrated in a relatively small number of countries within each geographic region[28]. In the cereals sector, maize has received the greatest attention, mainly from the private sector because of the perceived potential for widespread commercialisation, stemming from the extent and depth of the market, in part achieved by the extensive use of commercial hybrid maize seeds. By the mid-1990s, however, there had begun to emerge substantial private sector biotechnology-based breeding for other important cereal crops, including wheat and rice. Between 1995 and 1998, the value of the global market in bio-engineered crops grew from US$75 million to US$1.64 billion with maize accounting for 30 percent of the 28 million hectares planted with these crops in 1998[29]. For one of the world's most important cereals, rice, there has, in addition, been substantial public sector research. These developments suggest that the new technology may eventually become available for all cereals, with progress speeding up as hybrids become typical for cereal crops.

3.2 Producer-Oriented Biotechnology

Most of the biotechnology developments in the cereals sector have been concentrated in applications aimed at reducing the costs of production and crop losses.[30] The private sector has been at the forefront in developing the new applications that achieve cost savings through reducing the use of specific inputs (e.g. pesticides) or of certain processes (e.g. weeding). Applications that reduce crop losses are likely to have a similar impact, and moreover are likely to be beneficial in marginal areas. Although technologies that directly lead to increased yields are not widespread, many of those that achieve reduction in input costs and crop losses also result in enhancing average yields.

3.2.1 *Cost-reducing technologies*

So far, the most widely used transgenic cereal varieties achieve cost savings by incorporating characteristics that eliminate the need for using specific inputs of production. One example is cereal varieties containing a gene that makes the plant resistant to specific herbicides. This permits the farmer to use the particular herbicide to control weeds, rather than having to till the field intensively. There may be a cost

[28] C. Brenner and J. Komen, *International Initiatives in Biotechnology for Developing Country Agriculture: Promises and Problems*, Technical Paper No.100, Intermediary Biotechnology Service, OECD, October 1994, Section VI, p48.
[29] C. James and A. Krattiger, *Biotechnology for Developing-Country Agriculture: Problems and Opportunities (*IFPRI Focus 2, Brief 4 of 10, 1999).
[30] In the case of Bt maize, average cost savings were some $US 67 per hectare (C. James, *Global Status of Transgenic Crops*, ISAA Brief No. 5, 1997).

saving, either with respect to the herbicides that are actually used or with respect to the differential cost of spraying as opposed to cultivating. And, to the extent that this could help reduce crop production losses to weeds, its yield implications that may be significant. There are major patents covering a variety of techniques, involving different herbicides. Another example is the varieties containing genes that code for the toxin produced by Bacillus thuringiensis (Bt), a bacterial disease of insects. In this case, the farmer saves by eliminating the need for spraying against particular pests.

3.2.2 *Crop and post-harvest loss prevention*

Recently, many developments in cereal biotechnology have been focused on the prevention of crop losses due to pests, weeds and plant diseases. For virus management, the most common current genetic intervention is to insert into the plant cells, the genes that code for the coat proteins of the virus[31] and, for reasons that are only partly understood, this confers resistance against the virus. Alternative approaches are being explored, and some are broad enough that they may apply to cereals. In order to deal with insect pathogens, many of the techniques involve inserting the gene that codes for the toxin produced by Bt, as noted above. There are literally hundreds of patents in the area, including the process itself, on specific strains of Bt that are useful against specific categories of insects, and on specific methods of enhancing the effectiveness of these strains. In the United States' market, for example, Bt maize was introduced in 1996 to control the European "corn" borer, and new products to control the corn rootworm are expected in the 2000-2001 period.[32] Although there are fewer examples of biotechnology-based work to control fungal and other infections of crops, there are techniques that build resistance to certain pathogens or modify the reaction of the plant cells to infection so that they kill the fungus or die in the region of the fungal infection and thus prevent the infection from spreading.

Another area, albeit less developed, aims at enhancing the potential to grow cereals under conditions not normally associated with those crops. Limited research is taking place toward reducing the vulnerability of crops to stresses, such as drought and salt and toxic elements in soils. There has been discussion in the public sector of ways to reduce storage losses of crops, as, for example, by inserting genes that make the crop unpalatable to weevils, but do not affect its safety or palatability for humans or animals. This area of research is especially important for developing nations where the losses are particularly great, in some cases up to 30 percent of the crop, due to climate and to the inadequacy of storage facilities.

3.2.3 *Yield-enhancing technologies*

There are several ways that average yields can be directly increased. One is through improvements in the "architecture" of the plant to enable it to absorb more photosynthetic energy or convert a larger portion of that energy into grain rather than stem or leaf. This was, in essence, the "Green Revolution" approach of breeding dwarfing genes into plants so that the plants could make better use of fertiliser and water and produce more grain. This approach is being pursued again in the new rice

[31] "Coat protein of the virus" is the protein that surrounds the genetically active portions of a virus and typically enables the virus to enter a cell, so that it can then arrange for its reproduction using part of the cell's reproductive process.
[32] Peter Riley, "The Impact of New Technology on the Corn Sector: 1998 Update and Prospects for the Future," in USDA, Economic Research Service, Feed Yearbook, April 28, 1998.

architecture being studied by the International Rice Research Institute,[33] as well as by some private sector interests undertaking research in the fundamental mechanisms that control plant architecture. Another approach, for climates where this is useful, is to modify the plant for a shorter growing season by enhancing its efficiency in the use of fertilizer, pesticides and water. Molecular hybridization has also been demonstrated to increase the productivity of several crops, including rice and wheat, by 15 to 20 percent[34]. But it must be noted that the on-farm yield improvements observed so far have been for transgenic varieties developed to reduce on-farm production costs rather than for the purpose of increasing yields.

It is not yet clear, of course, whether yield increases experienced so far reflect a one-time advance, or the first stage of a continuing increase in yields. Considering, however, that there are many new technologies that will, over time, be applicable for plant improvements and/or integrated into plants, the most reasonable judgement is that the new technologies will continue to provide yield increases, that these will be introduced on a regular basis, and that each of the associated yield increases will be somewhat more than historical trends.

3.3 End-User Oriented Biotechnologies

The adaptation of cereals to specific end uses is another extremely important aspect of contemporary biotechnology-based breeding and may prove to be one of the more important developments for the improvement of diets in developing countries.

3.3.1 *Improving cereal quality*

There are many possibilities of improving the nutritional value of cereals by enhancing the presence of special nutrients or chemicals. A commercial example is the increase in the levels of biotin (vitamin H), for application in animal and human nutrition. Public sector breeders have also been looking into similar special purpose applications, such as inserting genes so that vitamin A and iron becomes available through the consumption of rice.[35]

Among the potentially more important applications for specific markets are those that seek to improve the quality of feed crops. New varieties of transgenic maize that contain higher oil levels to boost energy and improve feeding efficiency or have characteristics to reduce phosphorous in animal waste are examples that are currently under development.[36] And, in an interesting development that is certainly relevant to feed grains, there is a patent covering the insertion of a protein into plants when eaten would facilitate control of animal parasites.

[33] G.S. Khush, "Prospects of and Approaches to Increasing the Genetic Yield Potential of Rice, in R.E. Evenson, R.W. Herdt, & M. Hossain, Rice Research in Asia: Progress and Possibilities (CAB Int'l 1996), p. 59.
[34] C. James and A. Anatole (*op., cit*, 1999)
[35] G. Toenniessen, "Potentially Useful Genes for Rice Genetic Engineering," in G. Khush & G. Toenneissen, *Rice Biotechnology* (CABI 1991).
[36] USDA, Economic Research Service, "Value-Enhanced Crops: Biotechnology's Next Stage,"Agricultural Outlook, February 23, 1999.

3.3.2 *Development of new uses and traits for cereals*

Another important area of development is related to the various industrial uses that are made of grain crops for sucrose, starch or fuel. In the United States, currently about 20 percent of the maize production is destined for such markets, with the production of high-fructose corn syrup and of alcohol being the largest of a number of the industrial uses.[37] Maize and sorghum are among the crops that produce a high yield of starch/energy per hectare, and are the leading temperate zone crops for this purpose. In essence, it has become possible to vary the feed or starch production characteristics of important crop plants within wide bounds, making it possible to use almost any starch producing plant for many industrial purposes.

There are also other non-traditional uses of cereal crops, the most important example of which is cellulose, clearly available from other sources, but perhaps usefully produced in grain cultivation under certain circumstances. These developments may have significance for rice and other cereals which are more widely grown in developing countries. To the extent that imported cereals are priced higher than those domestically grown, using starch and other traits from domestically produced bio-engineered cereals in developing country industries could lead to costs savings and boost farm incomes.

Another important possibility is genetically altering crop plants for the production of proteins of pharmacological significance. Some of the patents in this area have wide applicability to different products, including for example, to the production of maize. One patent has very broad claims, but its examples emphasize production in rice. Several of the patents metion production of specific products, not all of which are therapeutic. However, commercial applications of these technologies are not yet widely available.

3.4 Geographic and Commodity-Specific Developments in Cereal Biotechnology

Based on the review of cereal bio-engineered products currently on the market, the use of maize altered in this way is greater than that for the alternative cereals[38]. The development and adaptation of maize among the major producing countries is due in part to the fact that most maize seeds are purchased each year because of the high use of hybrid seeds. The private sector has already introduced transgenic maize varieties, which have taken a significant portion of the seed market in the United States and Argentina. In 1999, transgenic maize constituted roughly about one-third of all maize produced in the United States. Rice offers a completely different picture. It is already grown extremely intensively in a number of developing nations, and, among the cereals, is that for which developing nations provide by far the largest relative production and participate as leading exporters. The leading biotechnology work on the crop is being conducted in the public sector and is largely oriented toward the requirements of Asian agriculture and, to a lesser extent, those of other parts of the developing world.

The private sector is just beginning to conduct research which may well be oriented toward Asia, depending on the evolution of intellectual property right issues and on the advances in developing rice hybrids. It seems very likely then that rice will

[37] U.S. International Trade Commission, *Industry and Trade Summary: Milled Grains, Malts, and Starches*, USITC Pub. 3095, March 1998, at p. A-6.
[38] http://www.bio.org/food&ag/approvedag98.html.

be the next crop after maize to shift to large-scale transgenic production, in particular among developing nations. Wheat and other grains offer a still different picture, in that they are already grown globally and often grown in marginal areas (in terms of rainfall or length of growing season). Wheat has only recently gained appeal for biotechnology research in the private sector. These efforts certainly lag those for maize and may lag those for rice - for wheat is self-pollinated**,** and the possibility of hybrid seed or other technical control means is only now emerging. For minor grains, such as millets, biotechnology research has been even less.[39] Thus, it appears that the implications of biotechnology for production and trade of these cereals are a longer way off, in particular in some developing countries which depend on these traditional cereals for basic diets.

3.5 Cross-Cutting Issues

The above discussion dealt with factors related to the direct effects of developments in biotechnology on the structure of supply and demand for cereals. National policies enacted to deal with environmental and public health issues stemming from biotechnology developments could also be important, partly through influencing the speed and direction of biotechnology research and partly through influencing consumer behaviour. International trade negotiations will also be important in shaping public sector policy on biotechnology development and implementation. These issues will be discussed in this section.

3.5.1 *Environmental and Bio-safety Issues*

Agricultural production has significant environmental consequences, and biotechnological changes in crops could modify these. The Green Revolution was linked directly to the use of modern inputs, such as mineral fertilisers and pesticides, to gain the benefits of the new varieties. It appears unlikely that the new biotechnology-based varieties will imply anything like the input changes associated with the Green Revolution. However, more stringent environmental regulations could shift the focus of biotechnology research towards techniques that could reduce some negative environmental effects of agricultural production. For eaxmple, research on cereal feeds to limit phosphorus and nitrogenous residues from livestock production, a serious problem especially in intensive production areas, such as in some developing countries, could have a significant positive payoff for the environment. Bio-engineered crops with improved drought and salinity tolerance, shorter growing cycles, etc., offer potential benefits for the environment as they could permit increased production with fewer inputs. As production requirements increase in the face of growing population and the increasing demand for animal feed, these factors will become more significant for developing-country agriculture.

Perhaps the potentially most limiting factor for the development and adaptation of biotechnology in cereals, as well as other crops, could be in the area of bio-safety, especially as it relates to human health and the environment. In the case of cereals, there has been concern expressed about the introduction of Bt into maize seeds and the possible implications for human health and the environment. The issue has been

[39] Charles Spillane, *Recent Developments in Biotechnology as They Relate to Plant Genetic Resources for Food and Agriculture*, Background Study Paper No. 9, Commission on Genetic Resources for Food and Agriculture, April 1999, Section 5.4, p.33.

raised with regard to the labelling of maize products which may have been produced from seeds containing the Bt gene. Moreover, since widespread application of some of the new technologies is relatively recent, assessments of their longer term effects on human health and the ecosytems have only just begun and will continue for some time. Hence, as long as such uncertainty remains, demand for these products is likely to be restrained in the short run.

With the introduction of large scale production of GM maize in the mid-1990s, the ability to segment or identify products containing new or altered characteristics has proven difficult and controversial. The labeling of GM products at the retail level, for example, to advise consumers of potential allergen reaction, requires the ability to trace the commodity from the farm, through the distribution, storage and processing stages. At this time, the cereal marketing systems in most countries appear to be inadequate to meet this requirement. In this regard, developing countries may have an advantage in that some cereals are still marketed in small lots where segregation is still possible. In addition, there is currently no effective method to grade and standardize cereals based on traits resulting from biotechnology.[40] This would be an important requirement to allow processors to make appropriate blends, whether for food products or animal feed, and to give farmers the appropriate price incentives to produce biotech crops.

3.5.2 *International Trade Agreements*

There can be no discussion of the developments in biotechnology without a mention of the global trading agreements under the World Trade Organization (WTO). The Sanitary and Phytosanitary (SPS), Technical Barriers to Trade (TBT) and the Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreements are likely to be the main international instruments through which biotechnology and trade issues will merge. In general, the SPS Agreement would allow importing countries to limit trade based on scientific evidence of potential human, plant and animal health risks and/or environmental degradation. While some countries require labelling of food products or components produced by genetic engineering, others do not. It is likely that such requirements for GMO labelling will become a multilateral or bilateral trade negotiating issue over whether such labelling constitutes a trade barrier.[41] Moreover, the UN-sponsored Biosafety Protocol, which failed to be approved in February 1999, would have required countries exporting GM products to obtain importing country approval prior to shipment. This requirement was rejected by the major grain exporting countries. Unfortunately, most developing countries have played a minor role in these negotiations and their interests and needs have not been fully taken into account. This, however, could change during the next WTO round where some developing countries have expressed their desire to be fully involved in those discussions.

[40] Spillane, Section 4.9, p.25.
[41] Spillane, p. 25.

3.6 Implications of Biotechnology for Developing Countries

The Green Revolution was largely focused on the development of technologies and farming systems, such as integrated pest management, to increase yields and production. This pattern contributed to a fall in imports and, in some cases, shift to exports of some nations. To the extent that the new biotechnologies permit increased cereal production in a food deficit nation, they could reduce the dependence on imports. Developments in biotechnology are also expected to reduce costs of production and, in some cases, processing, improve the quality of traditional products and/or create new uses of cereals. Over the longer term, one or all could give rise to new bases for production of cereals using genetically modified organisms (GMOs). On the supply side, the biotech developments reviewed in this paper have the potential to reduce per unit prices, depending on the *structure of the commodity markets*, through cost-cutting and higher yields, or both. This may create a competitive advantage for the farmers and countries which utilize the new technologies. The shorter-term impact of biotechnology will almost certainly be to strengthen the competitiveness of the current leading temperate-zone, cereal exporting nations.

However, in the longer run and to the extent that yields are often significantly lower in developing countries, the improvements in productivity resulting from the new technologies have the potential to be relatively greater there than those currently achievable in many major producing countries. There are certainly larger areas available in the developing countries that could potentially utilise such technological improvements.[42] Biotechnology developments that allow the production of cereals in zones not previously used for such cultivation have the potential to expand global production. For example, the ability to adapt wheat to more arid regions, or in regions with different patterns of wintering and photo-period sensitivity, is likely to expand production possibilities. Moreover, the new biotechnologies could also create varieties that reduce yield instability, and, hence, achieve more stability in production.

In addition to the production benefits, the new technologies also have the potential to limit post-harvest losses and to improve processing efficiencies. For developing countries facing chronic food shortages, this could have immense benefits.

However, cereals altered to produce certain characteristics more efficiently would also have the ability to compete with those crops that are traditionally grown for this trait. For example, biotechnology-based alternatives could substitute for high-yield starchy (energy) crops, such as sugar and cassava, especially for industrial and

animal feed uses. While these crops offer essentially the same industrial potentials as do coarse grains (primarily maize), they are almost certainly, in general, receiving less research attention. This, of course, could affect the market relationship between these crops which are produced predominantly by developing countries. This is an issue which developing countries need to examine strategically in terms of the *opportunity costs*.

[42] James (*op., cit*, 1998).

3.7 Biotechnology Policy Options for the Developing Countries

Developing countries, confronted with the acknowledgement that technological innovation and diffusion are crucial in stimulating economic growth and in enhancing competitiveness, are anxious to avoid any widening of the technological gap with the developed countries. For this reason, biotechnology is considered to be of strategic importance. The evolving framework in which agricultural biotechnology is being developed and diffused has major implications both for the generation and application of the new technologies in developing countries, and for international technology transfer. The barriers facing this new and evolving framework, within developing countries in comparison to the diffusion of the earlier Green Revolution technologies include: (1) budget stringency under structural adjustment and liberalization accompanied by stagnating investment in agricultural research; (2) the roles played by the public and private sectors; (3) a less prominent role played by the international agricultural research system, due not only to uncertainty about future financial support for the system, but also because they may not be at the forefront of developments in biotechnology; and (4) the strengthening of intellectual property rights protection and other international agreements[43].

Whether developing countries import biotechnology products or seek to develop their own (or a combination of both), does not cast doubt on the wisdom of developing local capacities and institutions. For developing countries, the biotechnologies being generated are increasingly costly, requiring high levels of scientific capability and skill and increasingly sophisticated and expensive equipment. Their application may also require high levels of management capability on the part of farmers. New biotechnology methods provide a powerful set of tools, which will, initially, complement but not supersede other techniques. It may therefore be important to strengthen capacities in the techniques required to underpin biotechnology such as plant breeding.

Given the scarcity of both human and financial resources in many developing countries, attempts should be made to create conditions whereby research efforts are not wasted and to improve the chances that successful research will lead to the diffusion of biotechnology. This would require that the constraints to technology transfer and diffusion be taken into account, whether they be regulatory procedures at the production level, inadequacies in the seeds sector, or problems of acceptance by farmers and consumers. It would also require strengthening the links and interaction among biotechnology research projects, among the relevant research institutions, between the biotechnology and agricultural research communities, and between public research institutions and the private sector[44].

For developing countries, the economic benefits of biotechnology are neither clear nor straightforward. It is therefore important that developing countries assess the comparative advantage of biotechnologies over existing technologies in the determination of the level of the potential demand for the new technologies. It is also important that more effort should be devoted to technology assessment and to improving methodologies available for this purpose.

[43] C. Juma and A. Gupta, *Biotechnology for Developing-Country Agriculture: Problems and Opportunities* (IFPRI Focus 2, Brief 6 or 10, 1999).
[44] Per Pinstrup-Andersen, *Biotechnology for Developing-Country Agriculture: Problems and Opportunities* (IFPRI Focus 2, Brief 9 or 10, 1999).

Clearly there can be no single policy blueprint for agricultural biotechnology. Each developing country will need to formulate its own strategy or policy for the development of biotechnology for use in agriculture. However, to ensure that biotechnology research is at the service of agriculture and all those who benefit from the fruits of the research, policy interventions will be required and at the same time, a certain number of conditions will need to be fulfilled:

- Biotechnology policies and programmes should be integrated within a sectoral context and within the framework of the problems confronting agriculture and agricultural research and with a clear sense of the specific problem areas to which biotechnology could best contribute. Biotechnology in itself will contribute little to agricultural improvement unless due attention is paid to the array of policies, including appropriate price policies, and institutions needed for sustainable agricultural development.

- In making decisions regarding the allocation of scarce human and financial resources to biotechnology, more attention should be devoted to assessing the effective demand for new biotechnology products. This would facilitate determination of the roles to be assigned to the public and private sectors, both with respect to coherent policies for investment in biotechnology and to testing, monitoring and disseminating biotechnology products. It would also enable governments to have a clearer indication of those technologies, which would require changes in management practices at the farm level, or for which there is no ready market.

- A further condition is the strengthening of linkages and networks among those concerned with developing and distributing biotechnology products, as well as those interested in developing and disseminating information about biotechnology. These linkages should be encouraged at all levels, whether formal or informal. For example, in India, a Biotechnology Jubilee Park for Women has been established with the aim of attracting women entrepreneurs to take up biotechnology enterprises. Effort should be made at the outset to involve the appropriate public and private decision-makers (including farmers) and the scientific community in the determination of a coherent national strategy.

- A final, essential condition to be met is that of national capacity building, whether in terms of human resources, financing or institutional development. Whatever policy decisions are taken with respect to biotechnology, developing countries will need to pay due attention to the universal aspects of bio-safety, the SPS and the TRIPs Agreement. Whether for biotechnology processes and products that are imported, or for those generated by local research, procedures for risk assessment will need to be in place.

Developing countries will need to strengthen their capacity to address these issues. In some instances this will require marginal changes in patent laws, health regulations, testing procedures and the like, while in other instances it may be necessary to create new structures to deal with these problems. Relevant guidelines or legislation for biosafety, SPS and TRIPs will also require implementation, monitoring and enforcement and, consequently, financial resources as well as technical and legal

expertise. It is important that progress be made in this area as the lack of adequate institutions continues to be a barrier to investment and progress towards the introduction and spread of genetically altered materials.

Finally, in those situations where public sector systems are no longer fulfilling their earlier roles as a result of market liberalization and where technology markets are not yet fully developed, alternative technology transfer and diffusion mechanisms for *public good* technologies in developing country agriculture may be needed. These would need to involve a diversity of public and private partners.

3.8 Summary and Conclusions

The technologies that have been developed are largely aimed at reducing cereal production costs. The crops receiving the most attention have been those which are likely to be more profitable for producers when compared to traditional varieties and where hybrids and agricultural chemicals are heavily used by the commercial farmers. For developing countries, the benefits are still a long way off. However, if public sector biotechnology research picks up momentum and the results benefit the developing countries, this could lead to improvements in the food security status for these countries through technologies developed to stabilize cereal production and to offer opportunities to produce in marginal zones previously limited by soil and climate conditions. Almost certainly, in spite of the best efforts of the public sector, the technologies oriented toward developed world cereal markets will, at least initially, develop faster than those related to developing world agriculture. Probably the key issue from the perspective of developing nations is whether the technologies developed for specific conditions in the developed countries will be suitable so that they are adopted by producers in the developing countries as well. In this regard, there appears to be an urgent need for more public funded research which would likely benefit cereal production in the developing countries.

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