



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

MARKETS ACCESS, APPROACHES AND OPPORTUNITIES FOR QUALITY
PROTEIN MAIZE PRODUCTS

By

Ouma, James O.; Bett, C.; and Githaigah, T.

Contributed Paper presented at the Joint 3rd African Association of Agricultural Economists (AAAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010.

MARKETS ACCESS, APPROACHES AND OPPORTUNITIES FOR QUALITY PROTEIN MAIZE PRODUCTS

James.O.Ouma¹, C. Bett² and T.Githaigah³

¹Kenya Agricultural Research Institute, Embu
P.O. Box 27-60100, Embu
Email: j_okuro@yahoo.co.uk

²Kenya Agricultural Research Institute, Katumani

³Catholic Diocese of Muranga

ABSTRACT

Lack of access to nutritious food is an underlying and major cause of child mortality in Africa. Improving the nutritional quality of food crops, through biofortification, would be a useful complementary strategy to other agricultural and public health interventions. Quality Protein Maize (QPM) varieties have been developed through biofortification. Consumption of these varieties leads to greater protein utilisation in adults and children. In Kenya three QPM varieties have been released. In Central Kenya, particularly Kirinyaga district, farmers have come together through Innovation Platform for Technology Adoption (IPTA) with the aim of production, value addition and marketing of QPM based products. These groups require information on the potential markets for the new QPM based products. The study was therefore conceived with the aim of collecting and providing information about potential market that can be used by farmers in the IPTAs in deciding how QPM based products should be designed, delivered, priced, and marketed. The study used the Rapid Market Appraisal (RMA) approach. Market outlets in Kirinyaga, Embu and Nairobi were first identified through the guidance of staff of the ministries of agriculture, trade, education, health and local authority. The market outlets were classified as retail, wholesale, schools, hospitals, restaurants/hotels and food stores/processors. 60 respondents in the different outlets were interviewed using separate sets of pretested questionnaires in June-July 2009. 17 questionnaires were not fully completed and were not included in the analysis. Data collected was subjected to analysis using SPSS. Although the awareness level about QPM was low (35 % (n=43), there was desire to buy QPM products. 95 % (n=43) expressed the desire to buy products but required samples of the products before making final decision. The potential demand varied from outlet to outlet but on average there was demand of about 0.8 tons per month. Promotional campaigns need to be intensified to create more awareness and increase demand. Farmers groups will also require to meet quality standards as they produce and market QPM products in the various outlets.

Key words: market; products ; Quality Protein Maize; Rapid market appraisal

INTRODUCTION

Malnutrition is widespread in Sub-Saharan Africa, and the problem is worsening (Rosegrant et al., 2001). The region has difficulty matching its food production with its population growth. Especially in Eastern and Southern Africa, maize is an important staple food (Byerlee and Eicher, 1997; McCann, 2005). Unfortunately, the nutritional value of maize is rather poor, due in part to the low biological value of its protein (Truswell and Brock, 1962). Maize protein is particularly low in the limiting amino acids tryptophan and lysine. To optimize the use of maize protein, it should therefore be consumed with complementary protein sources, high in the limiting amino acids. These complementary sources, usually animal products or legumes, tend to be expensive or, particularly for beans, take a lot of time and fuel to cook.

To improve its nutritional value, breeders have been looking for ways to increase lysine and tryptophan content in maize (Vasal et al., 1980). The strategy was to provide this maize to populations with diets of poor protein quality, in regions with high maize production and consumption, to reduce malnutrition and improve growth and health, particularly in young children (Lauderdale, 2000). This development started with the discovery of the *opaque-2* gene, a recessive gene that almost doubles lysine and tryptophan content (Mertz et al., 1964). Unfortunately, the gene also carried negative side effects, in particular reduced yields and resistance to storage pests (Prasanna et al., 2001). Continued efforts by breeders at the International Maize and Wheat Improvement Centre (CIMMYT), however, yielded varieties with the *opaque-2* gene and the resulting improvement in protein quality, but without the negative effects on agronomy and storage (Vasal, 2000). These varieties, called

quality protein maize or QPM, have been developed for a wide range of agroecological zones and have been released in Latin America, Africa and Asia (Krivanek et al., 2007).

Over the years, a range of studies has been undertaken to document the effect of QPM on the nutritional status of children in many maize-consuming areas of these continents, typically by comparing the growth of children fed a diet with QPM with that of children fed a diet with conventional maize. A meta-analysis of eight of these studies indicated that consumption of QPM instead of conventional maize varieties leads to an 8% increase in the rate of growth in height and a 9% increase in the rate of growth in weight in infants and toddlers with mild to moderate undernutrition for whom maize is a significant part of the diet (Gunaratna et al., 2008).

The National Agricultural Research Systems (NARSs) in Eastern Africa in collaboration with International Maize and Wheat Improvement Center (CIMMYT) have released QPM varieties. Currently, CIMMYT in collaboration with its partners (NARSs, seed companies and NGOs) in the region are involved in promotional campaigns to increase QPM adoption and consumption among other farm families. In Kenya, two QPM hybrids namely KH631Q) and KH500Q) were released in 2004 while one QPM OPV, WSQ104 was released in 2006. Through IPTAs, farmers groups particularly in Kirinyaga district are involved in production value addition, processing and marketing of QPM based products (see fig 1). However, they require market information as they produce and plan to market the products. This study was therefore conceived with the aim of collecting and providing information about

potential market that can be used by farmers in IPTAs in deciding how QPM based products or service should be designed, delivered, priced, and marketed. In addressing the objectives the study attempted to answer the following questions;

1. How much of a demand is there for the product ?
2. What are potential customers' needs and price expectations?
3. Who are the competitors?
4. What are the strengths and weaknesses of the competitors from your potential customers' perspective?

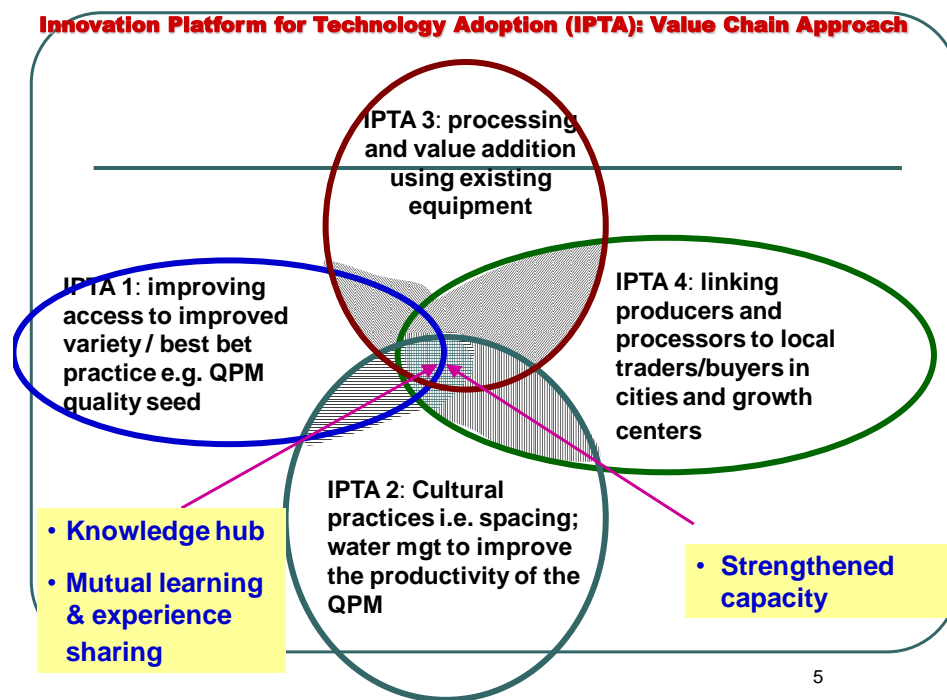


Figure 1: Innovation platform for technology adoption: value chain approach

Methodology

Sampling

Key categories of market outlets were first identified through review of secondary information and consultations. The key market outlets identified were retail, wholesale, schools, hospitals, restaurants, hotels and food stores/processors. The retail outlets included supermarkets, market vendors and ‘kioks’. In each of the three towns of Kirinyaga, Embu and Nairobi, list of outlets for each market category were developed through the guidance and assistance of staff of the ministries of agriculture, trade, education, health and local authority. 60 respondents in the different market outlets were selected and interviewed in June-July 2009.(see table1)

Table 1. Number of market outlets sampled by towns

Market outlet	Embu			Total	Nairobi			Total	Kirinyaga			Total	Total
	Owner	Manager	Employee	All	Owner	Manager	Employee	All	Owner	Manager	Employee	All	Overall
Retail	1	1	1	3 (30)	2	2	-	4 (50)	5	-	3	8(32)	15 (35)
Wholesale	1	-	-	1 (10)	-	-	1	1 (13)	3	-	-	3(12)	5(12)
School	-	1	1	2 (20)	-	1	-	1(13)	-	5	-	5(20)	8(19)
Hospital	-	-	1	1 (10)	-	-	-	-	-	-	2	2(8)	3(7)
Hotel/restaurant	-	-	3	3 (30)	-	2	-	2 (25)	2	3	2	7(28)	12(28)
Total	2	2	6	10	2	5	1	8	10	8	7	25	43

Figures in parenthesis represent %

Data collection and analysis

Two sets of questionnaires were prepared. The first questionnaire targeted respondents in the retail outlets, while the second collected information from respondents in schools, hospitals, restaurants and hotels. The two sets of questionnaires were first pretested in the market outlets in Kirinyaga by trained enumerators. Data was then collected by enumerators through face to face interview. In some situations, respondents insisted on filling the questionnaires on their own and requesting the enumerators to pick the questionnaires the following day. A number of respondents also declined to divulge full information and such questionnaires were not included in the analysis.

Data was entered and analysed by Scientific Package for Social Sciences version 15

Results and Discussions

Type of respondents interviewed

Three categories of respondents were interviewed in the market outlets. These were owners (33 % (n=43), managers (35 % (n=43) and employees (33 % (n=43). While more of the respondents interviewed in the retail and whole market outlets were owners, most of those interviewed in the schools were managers, 100 % of the respondents in hospitals were employees and a mix of managers and employees were interviewed in the hotels and restaurants (Table 2).

Table 2: Status of respondents by market outlet categories

	Retail		Wholesale		School		Hospital		Hotel/restaurant		Total	
	No	%	no	%	no	%	no	%	no	%	no	%
owner	8	53	4	80	0	0	0	0	2	17	14	32.6
manger	3	20	0	0	7	88	0	0	5	42	15	34.9
employee	4	27	1	20	1	13	3	100	5	42	14	32.6
	15		5		8		3		12		43	100

Markets for QPM based flours

First the respondents were asked to give an indication of level of awareness of QPM and then the willingness to buy QPM based flours. Table 3 shows that there was generally low level of awareness about QPM among the respondents. Overall 35 % (n=43) of the respondents indicated that they were aware of QPM, while a larger proportion (65 % (n=43) stated that there were not aware of QPM. Awareness was relatively higher among the respondents in the retail outlet. The term QPM was then described to the respondents who had no knowledge about the existence of QPM. This was followed by a question on willingness to buy QPM based flour. 95 % (n=43) were willing to buy QPM based flour. A small proportion (2 % (n=43) of respondents were not sure about purchasing QPM and these respondents were in the retail market outlets category. Respondents expressed the need to have the samples to make full

judgment. Among the respondents (N=15) aware of QPM, 60 % got information from public extension service of the Ministry of Agriculture, the second source being the electronic media (TV/radio). Only 13 % (n=14) of the respondents reported having received information from the research and a small proportion reported having known about Quality Protein Maize through friends. A higher proportion of respondents indicated having known about QPM recently: 2009, while 27 % noted having known about QPM in 2007, 20 % in 2008 and 6.7 % in 2006. Among the respondents aware of QPM, 80 % (N=15) were located in Kirinyaga. Promotional campaigns through the QPMD and DONATA projects were likely to have contributed to high awareness level.

Table 3: Level of awareness of QPM and willingness to buy QPM based flours

Outlets	Awareness of QPM		Total	Willing to purchase QPM based flour			Total
	Yes	No		Yes	No	Not sure	
Retail	7 (50)	7(50)	14	12 (85.7)	1 (7.14)	1 (7.14)	14
Wholesale	2 (33.3)	4 (66.7)	6	6 (100)	0	0	6
School	2 (25)	6 (75)	8	8 (100)	0	0	8
Hospital	1 (33.3)	2 (66.7)	3	3 (100)	0	0	3
Hotel	3 (25)	9 (75)	12	12 (100)	0	0	12
All	15 (34.9)	28 (65.1)	43	41 (95.3)	1(2.33)	1(2.33)	43

The respondents were further to show their intention of buying QPM based flour by responding to some sentences. Overall 57 % the respondents indicated that they had the intention of buying QPM based flour, 19 % indicated that they were definitely going to buy the QPM product, while only 2.4 % categorically stated that they were not going to buy the new product (Table 4). The respondents who stated that they were probably going to buy required the sample to be definite about buying the QPM based product

Table: 4: Willingness to buy QPM based flour

Market outlet	Definitely buying this product	Probably buying this product	Don't know if i will buy or not this product	Will not buy the product	
Retail	3 (23.1)	8 (61.5)	2 (15.4)	0	13
Wholesale	1 (16.7)	3 (50)	2 (33.3)	0	6
School	2 (25)	5 (62.5)	1(12.5)	0	8
Hospital	0	3 (100)	0	0	3
Hotel	2 (16.7)	5 (41.7)	4 (33.3)	1 (8.3)	12
All	8 (19)	24 (57.1)	9 (21.4)	1 (2.4)	42

Figures in parenthesis represent percentages

The potential demand for QPM based flour in the various market outlet categories was determined by asking the participants to give an indication of the amounts they were willing to buy and at what frequency. These were translated to a month's requirement in terms of bags. A few of the respondents did not give any indication of the potential amounts. These respondents either expressed the need to have the samples or peg their future demand for the new product on the flow of goods once on the shelf. Overall the potential monthly demand was about 9 bags of QPM based flour ranging from a minimum of 0.04 bags to about 67 bags. The highest potential demand of about 25 bags per month was expressed by respondents in the wholesale outlet. Hospitals and retail outlets each expressed potential demand of about 8 bags per month. The common supply unit among the respondents was bale containing 12 units of 2kg each. The mean price quoted was ksh 1011.18. This happens to be below the price of most of the nutritionally enhanced maize (with vitamins, soya and amaranthus) flour such as Incas, pendana, jogoo extra and hostess.

Table 5: Potential demand (bags/month) for QPM based flour by market outlet category

Market outlet	N	Minimum	Maximum	Mean	Std. Deviation
Retail	12	1.3	16.0	7.8	4.3
Wholesale	6	4.4	66.7	24.7	24.3
School	8	0.3	8.6	5.4	3.5
Hospital	3	0.0	22.2	7.6	12.7
Hotel	12	1.1	8.6	3.6	2.6
All	41	0.04	66.7	8.6	11.8

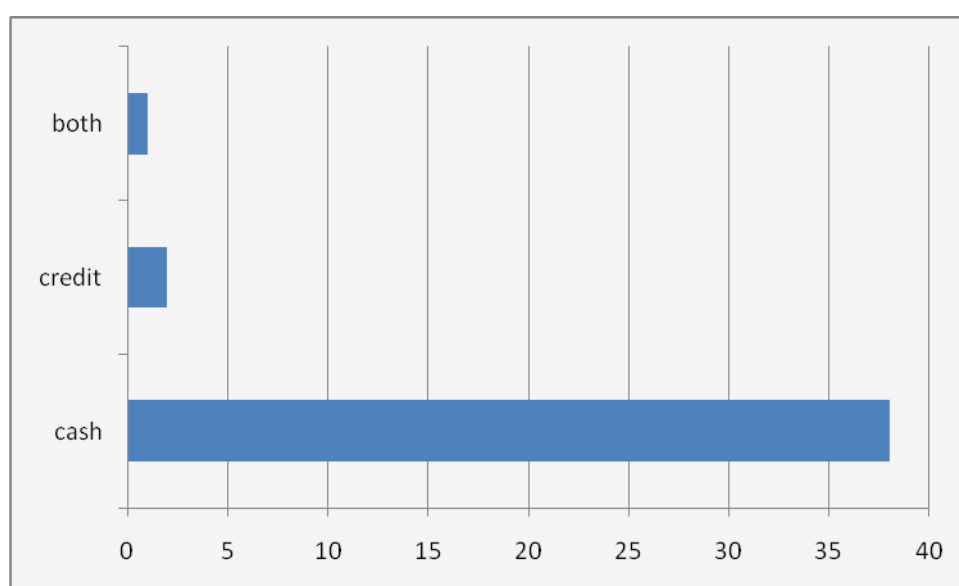


Figure 2: Mode of payment for QPM product delivered

Table 6 Responses on expected quality aspects

	Responses		Percent of Cases
	N	Percent	N
KEBS certified	5	20.83	25
Free from toxins	2	8.33	10
Palatable	4	16.67	20
good packaging	13	54.17	65
	24	100	120

Strategies for promotion of QPM based flour

86 % (n=43) of the respondents indicated that promotional campaigns for the QPM products were necessary to create awareness and encourage demand. Various

channels for creating awareness for the QPM based products were suggested namely use of brochures or pamphlets, electronic media (TV/Radio), field days (including Agricultural Shows of Kenya (ASK), chiefs baraza, road shows and promotion of samples in supermarkets and for products conduct sensory evaluation where possible for other QPM based flours. Field days (62 % (n=37) were cited as the most effective vehicle for creating awareness for QPM based products. The use of the media (print and electronic media) was cited as the second most important strategy for communication information regarding QPM based products. Creating awareness through provision of random samples to customers in supermarkets was also cited as another effective way. Other minor strategy cited was promotion through road shows. The respondents further indicated that the promotional costs would be the responsibility of the supplier, the farmers groups. All the respondents in the market outlets indicated that they would be interested to receive feedback of the survey and that we were welcomed for any further enquiry.

Table 7: Strategies for promotion of QPM based flour

	No of respondents	%
Brochures/pamphlets	4	10.8
Media	4	10.8
Field days	23	62.2
Chiefs “baraza”	1	2.7
Road shows	1	2.7
Provision of random samples in market outlets	4	10.8
Total	37	100.0

Conclusion

The study shows low awareness of QPM among the respondents interviewed in the market outlets. However, there is strong willingness to buy QPM products but most respondents require samples of the products before making final judgment. The farmers groups also require to meet quality standards by understanding the requirements of KEBS. Low awareness of QPM however requires strong promotional campaigns through the support of various stakeholders.

References

- Bilinsky, P., and A. Swindale. 2007. Months of Adequate Household Food Provisioning (MAHFP) for Measurement of Household Food Access: Indicator Guide. Food and Nutrition Technical Assistance Project (FANTA), Academy for Educational Development, Washington, DC
- Byerlee, D., and C.K. Eicher. 1997. Africa's Emerging Maize Revolution Lynne Rienner Publishers, Boulder, Colorado.
- CIMMYT. 1988. From Agronomic Data to Farmer Recommendations: An Economics Training Manual. Completely revised edition CIMMYT, Mexico, D. F.
- CIMMYT Economics Program. 1993. The Adoption of Agricultural Technology: A Guide for Survey Design CIMMYT, Mexico, D.F.
- Coates, J., A. Swindale, and P. Bilinsky. 2006. Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide. Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington, D.C.
- De Groote, H., M. Siambi, D. Friesen, and A. Diallo. 2002. Identifying farmers' preferences for new maize varieties in Eastern Africa, p. 82-102, *In* M. R. Bellon and J. Reeves, eds. Quantitative Analysis of Data from Participatory Methods in Plant Breeding. CIMMYT, Mexico, D.F.
- Ellis, F. 2000. Rural Livelihoods and Diversity in Developing Countries Oxford University Press.
- Evenson, R.E., and D. Gollin. 2003. Assessing the Impact of the Green Revolution. *Science* 300:758-762.
- Gunaratna, N.S., G.P. McCabe, and H. De Groote 2008. Evaluating the Impact of Biofortification: A Meta-analysis of Community-level Studies on Quality Protein Maize (QPM). Paper presented at the 12th Congress of the European Association of Agricultural Economists (EAAE), Gent.
- Ghirotti, M. Rapid appraisal: benefiting from the experiences and perspectives of: livestock breeders [Online] <http://www.fao.org/docrep/V1650T/v1650T0d.htm#TopOfPage> (verified May 15, 2009).
- Hassan, R.M., Mulugetta Mekuria, and W. Mwangi. 2001. Maize breeding research in eastern and southern Africa: Current status and impacts of past investments made by the public and private sectors, 1966-97 Economics Program, International Maize and Wheat Improvement Center (CIMMYT), Mexico.
- Gunaratna, N.S., G.P. McCabe, and H. De Groote 2008. Evaluating the Impact of Biofortification: A Meta-analysis of Community-level Studies on Quality Protein Maize (QPM). Paper presented at the 12th Congress of the European Association of Agricultural Economists (EAAE), Gent.
- Jaetzold, R. 1983. Farm management handbook of Kenya: natural conditions and farm management information Vol.II/C - East Kenya (Eastern and Coast provinces). Ministry of Agriculture and Livestock Development, Nairobi, Kenya.
- Krivanek, A.F., H. De Groote, N.S. Gunaratna, A.O. Diallo, and D. Friesen. 2007. Breeding and Disseminating Quality Protein Maize (QPM) for Africa. *African Journal of Biotechnology* 6:312-324.
- Lauderdale, J. 2000. Issues Regarding Targeting and Adoption of Quality Protein Maize (QPM) CIMMYT (International Maize and Wheat Improvement Center), Mexico D.F.
- McCann, J.C. 2005. Maize and Grace: Africa's Encounter with a New World Crop, 1500-2000 Harvard University Press, Cambridge.

- Mertz, E.T., L.S. Bates, and O.E. Nelson. 1964. Mutant Gene That Changes Protein Composition and Increases Lysine Content of Maize Endosperm. *Science* 145:279-280.
- Morris, M.L., R. Tripp, and A.A. Dankyi. 1999. Adoption and impacts of improved maize production technology: A case study of the Ghana Grains Development Project. Economics Program Paper 99-01. CIMMYT, Mexico, D.F.
- Prasanna, B.M., S.K. Vasal, B. Kassahun, and N.N. Singh. 2001. Quality protein maize. *Current Science* 81:1308-1319.
- Rosegrant, M.W., M.S. Paisner, S. Meijer, and J. Witcover. 2001. 2020 Global Food Outlook Trends, Alternatives, and Choices International Food Policy Research Institute (IFPRI), Washington, D.C.
- Sehmi, J.K. 1993. National Food Composition Tables and the Planning of Satisfactory Diets in Kenya. Government Printer, Nairobi, Kenya.
- Swindale, A., and P. Bilinsky. 2006. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2). Food and Nutrition Technical Assistance Project (FANTA), Academy for Educational Development, Washington, D.C.
- Swindale, A., and P. Bilinsky. 2006a. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide, Version 2. Food and Nutrition Technical Assistance Project (FANTA), Academy for Educational Development, Washington, DC
- Swindale, A., and P. Bilinsky. 2006b. Development of a Universally Applicable Household Food Insecurity Measurement Tool: Process, Current Status, and Outstanding Issues 1–3. *Journal of Nutrition* 136:1449S-1452S.
- Truswell, A.S., and J.F. Brock. 1962. The Nutritive Value of Maize Protein for Man *American Journal of Clinical Nutrition* 10:142-152.
- Vasal, S.K. 2000. The quality protein maize story. *Food and Nutrition Bulletin* 21:445-450.
- Vasal, S.K., E. Villegas, M. Bjarnason, B. Gelaw, and P. Goertz. 1980. Genetic modifiers and breeding strategies in developing hard endosperm opaque-2 materials, p. 37-73, In W. G. Pollmer and R. H. Phipps, eds. Improvement of quality traits of maize for grain and silage use. Martinus Nijhoff Publ., The Hague.
- Young, V.R., and P.L. Pellett. 1990. Current concepts concerning indispensable amino acid needs in adults and their implications for international nutrition planning. *Food and Nutrition Bulletin* 12.
- Young, V.R., and P.L. Pellett. 1990. Current concepts concerning indispensable amino acid needs in adults and their implications for international nutrition planning. *Food and Nutrition Bulletin* 12:289-300.