The FAPRI-University of Pretoria Collaboration

Final Report for the University of Missouri South African Education Program

FAPRI–UMC Report # 07-04

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Aim of the Collaboration

The aim of the collaboration is to facilitate academic exchange between the University of Pretoria and the University of Missouri in the area of agricultural economics. In particular, staff at the University of Pretoria Department of Agricultural Economics, Extension, and Rural Development wished to build agricultural sector modeling capacity similar to that employed for many years by the Food and Agriculture Policy Research Institute (FAPRI). The models are used to provide projections of the main variables for the agriculture and food sector over a period of 10 years, with the ability to provide analysis of policy changes. Analysis of this sort has in the past been found useful to policy makers and those within the industry.

Who are FAPRI?

Established in 1984 by a grant from the U.S. Congress, FAPRI is a unique, dual-university research program. Participants are the Center for National Food and Agricultural Policy (CNFAP) at the University of Missouri-Columbia (UMC), and the Trade and Agricultural Policy Division of the Center for Agricultural and Rural Development (CARD/TAPD) at Iowa State University.

In studies ranging from the farm to the international marketplace, FAPRI uses comprehensive data and computer modeling systems to analyze the complex economic interrelationships of the food and agriculture industry. FAPRI is also applying an integrated approach to examining issues that affect both farm finances and the local environment. This system can be used to estimate what a change in agricultural practice will mean for everything from the net income of a representative farm to water quality.

FAPRI prepares baseline projections each year for the U.S. agricultural sector and international commodity markets. The multi-year projections are published as FAPRI Outlooks, which provide a starting point for evaluating and comparing scenarios involving macroeconomic, policy, weather and technology variables. FAPRI pursues research partnerships internationally in countries such as Ireland, the UK, Japan, Korea and now South Africa.

Academic exchange undertaken during the project

FAPRI has been able to provide the modeling team from Pretoria with assistance in building the econometric model of the agricultural sector. Members of the modeling team have visited FAPRI twice, with another visit scheduled for July. Members of FAPRI staff have also been to South Africa in order to interact with the modeling group there and also teach a short course related to the fundamentals of the modeling the agricultural sector.

Summary of exchanges:

Summer/Fall Semester 2002: Ferdinand Meyer visited Columbia. During this period he took several classes related to the modeling project. He also spent time with FAPRI staff as he developed the model of South Africa. Ferdinand also participated in some of the FAPRI activities, such as the annual development of baseline projections from the global model, and the review of these projections. FAPRI's work benefited from Ferdinand's experience of African agriculture.

August 2002: Patrick Westhoff traveled to Pretoria and participated in the LEK 810 course. He presented a short course on models and policy analysis with a focus on developing countries. This involved the development of a small spreadsheet model of a simple agricultural sector for teaching purposes. Whilst visiting Pretoria, Patrick also worked on the South African model with the staff there.

July 2003: Ferdinand Meyer and PG Strauss visited Missouri. The initial projections from the South African model were reviewed by FAPRI staff and policy scenarios were undertaken. Ferdinand and PG visited with FAPRI staff members regarding the extension of the South African modeling project to include representative farm models, similar to those that are maintained by FAPRI.

August 2003. Julian Binfield visited South Africa. Julian presented a paper at the International Association of Agricultural Economics conference in Durban.[1] He then traveled to Pretoria where he participated in the LEK 810 class, lecturing on model construction and using the teaching model developed by Patrick the year before. Whilst in Pretoria Julian worked with the staff there on the South African model, policy scenarios, and on the possibility of simulating the model stochastically. He also presented a seminar to the staff there.

July 2004. Ferdinand and PG will visit both FAPRI-Missouri and FAPRI's partners in Texas A & M. Whilst in Missouri Ferdinand and PG will work on the South African model, with input from FAPRI staff. PG will work with the FAPRI representative farm models. While at College Station Ferdinand and PG will take a course using the Simitar software developed there by James Richardson. This will assist in the generation of farm level models, and the simulation of the econometric model stochastically.

Outline of the course taught at University of Pretoria by FAPRI Staff members

While FAPRI members were in South Africa they taught part of the LEK 810 (Econometrics) course to postgraduate students attending the University of Pretoria. The lectures aimed to provide an introduction to the construction of a model and its simulation for policy analysis. Topics included; supply response, risk and uncertainty, modeling demand, trade, and model closure. Examples from the region were used.

[1]Julian Binfield, Patrick Westhoff, Robert Young II. "Reforming the CAP: A Partial Equilibrium Analysis of the MTR Proposals". Contributed paper selected for presentation at the 25th International Conference of Agricultural Economists, August 16-22, 2003, Durban, South Africa

Practical modeling instruction was provided through the use of the "M-S-C Model" teaching tool. Developed by Dr Westhoff, this simple spreadsheet model uses fictional data and parameters to model maize, sorghum, and chicken markets for a fictional country. The model treats historical data as given and generates estimates over a 3-year horizon. The model can be used by students to perform simple policy experiments and thereby learn the fundamentals of dynamic partial equilibrium modeling in an agricultural setting.

The modeling project at Pretoria

The Department of Agricultural Economics, Extension and Rural Development at the University of Pretoria has over the last few years been involved in several initiatives to serve the South African agricultural sector with information to improve decision making. Lately the Department has started to build and improve its own analytical capacity through collaborative efforts with international experts and universities. These initiatives include a series of commodity models to be able to monitor the effect of world market changes on the situation in our domestic markets.

Agriculture in South Africa

With the change in the political regime in 1994, South Africa instituted a major change in its agricultural policies in the form of legislation introduced in 1996. The legislation eliminated a large number of parastatal marketing boards on products ranging from sugar to maize (corn). Today, there are essentially no marketing boards, and cooperatives and producer groups play a much stronger role. Further, nearly all direct subsidies to producers have been eliminated, aligning South Africa with countries like New Zealand and Australia.

While South Africa has shifted to an unsupported agricultural system, it is also attempting to significantly expand the contribution of small and medium sized farmers to the agricultural sector at large. Under the previous political regime, black farmers were

precluded from farming in some regions of the country and as a result were also excluded from the mainstream of South African agriculture. The challenge for South Africa is now to ensure that black farmers who potentially can obtain land do have something to sell, do have access to markets and do make a decent living and income and also has a chance to enter some of the higher value markets other than grain and livestock. Thus providing opportunities and opening up markets for high value commodities will be extremely important for the feasibility of Black Economic Empowerment (BEE)/ Black Business Development (BBD) projects. This process is only likely to succeed if the planning by farmers, agribusiness and government officials take into account changes in world and domestic markets.

It is particularly critical for South African agriculture to know the future directions of the world market, since the elimination of all state control boards and relaxing of import controls has exposed South African agriculture to the dynamic changes in world agricultural markets. Recent developments in markets have shown that the future will pose an enormous challenge for the farming community, agribusinesses, the agri-food sector, and the economy as a whole. This is largely due to increased regional integration resulting from the SADC free trade protocol, the European Union/Republic of South Africa free trade agreement and the new World Trade Organization rules and negotiations.

It was decided that an appropriate way to meet the challenge of providing timely, accurate and relevant analysis was through dynamic partial equilibrium models similar to those used by FAPRI to analyse market and policy developments. Models of the agricultural sector provide the opportunity to simulate the impact of market and policy changes as well as external influences such as world market changes on domestic prices, demand, supply, farm income and other important socio-economic variables. This is of particular importance for South Africa where the social and economic contribution of the agricultural sector to the economy is considerable

The state of agricultural markets affects everything from the income of farmers to the trade balance. Projections of the outlook for agricultural commodity markets under various scenarios help farmers and businesses make better production and investment decisions. Reliable estimates of the quantitative impacts of policy alternatives help government officials develop policies that will achieve desired objectives.

While the programme is intended to generate specific outputs (e.g., the data base, models, and markets projections), it is also intended to encourage a process, which will establish formal and informal networks among researchers and industry specialists. Links to policy makers should ensure that the most relevant questions are investigated and that the analyses contribute to the policy process.

When this project was initiated in 1999 the overall objective was to develop a system of econometric models for the major crop, dairy and livestock sectors of the Republic of South Africa. This system has been developed and is currently used to generate future projections for product markets. It is planned to develop further models for the fruit and vegetable sectors, depending on funds available. The objective now is to link this system of equations (the econometric model of the aggregate farm sector) to farm level. The complete model will provide a system of economic intelligence on agricultural markets as well as a barometer to measure the impact of market and policy changes on the agricultural sector.

There are a variety of econometric models for world agriculture currently in operation, such as the Food and Agricultural Policy Simulator Model (FAPSIM), developed by United States Department of Agriculture the Australian Bureau of Agricultural and Resource Economics model and the AGLINK model maintained by the Organisation for Economic Co-Operation and Development. All these models are partial equilibrium models. The FAPRI system has an advantage in that it links sectoral models to models of farm-level finance, environmental and natural resources indicators. All these models have their basic foundation in econometric and economic theory and they also do account

for the biological component of agriculture. After reviewing these models, the following modelling approach was adopted for the econometric and farm model:

The econometric model

- For each commodity, the important components of supply and demand were identified. For a typical crop, those components included were the area devoted to production, the yield per hectare, total production, direct human consumption, industrial use, exports, imports, and ending stocks.

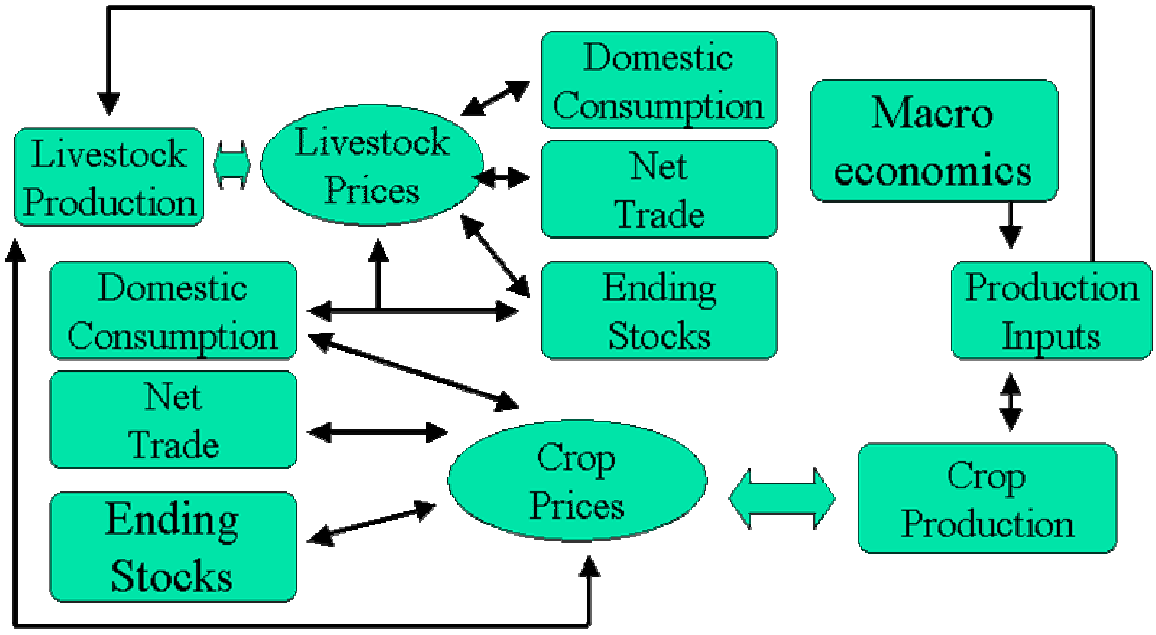
- For each of the components of supply and demand, behavioural equations were specified and the parameters estimated utilizing econometric techniques.

- Although a single-equation approach was used for initial estimation, considerable emphasis was placed on ensuring cross-equation and cross-commodity consistency. Supply equations, for example properly have to reflect competition for land and other resources.

- Special care was taken to ensure that policy variables are correctly incorporated in the model to reflect the fundamental structure of the agricultural commodity market.

- The principal objective was to develop a model that generates the best possible estimates of market outcomes under alternative scenarios. While econometric techniques were used where feasible and appropriate, in some cases is was necessary to obtain model parameters using other techniques, such as mathematical programming, expert judgment, and other approaches.

- Figure 2 illustrates the interaction between the commodities of the livestock sector and the crops sector (Specific commodities presented in figure 1).



The farm level model

In evaluating changes in markets and policies, one of the critical social sustainability questions is the likelihood of financial survivability at the farm level. One approach which has been successfully utilized elsewhere in helping to determine how the market and policy changes will impact on the farm is to develop a set of farm-level models, linked to the kind of sector-wide models described earlier. These farm models are structured to incorporate information on tax and other government policies, as well as dealing with the weather and other risk factors associated with production in agriculture. Input data comes from either survey information or from producer panels.

Of particular importance is that the system link to the kind of forward-looking international market analysis system envisioned and that the system be dynamic, allowing for the year-to-year transition of these farms.

Results from the modeling system

The model is used initially to generate projections in the form of a baseline. The "baseline" refers to a set of forecasted values for the important model variables under a set of macroeconomic forecasts obtained from elsewhere, and under the assumption of constant policy and normal weather. The baseline is then compared to projections under different scenario simulations.

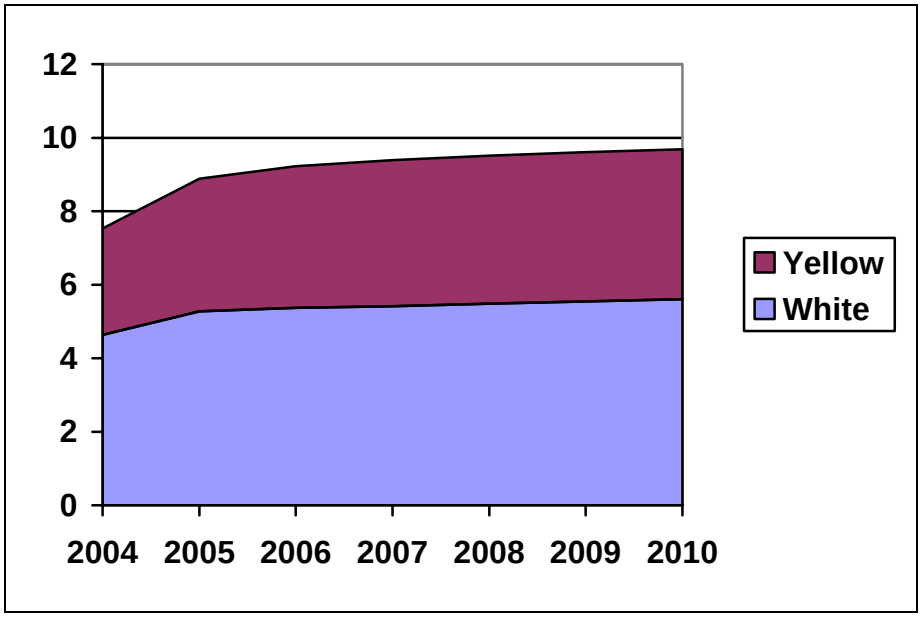
The baseline of the model is presented in the appendix in the form of supply-and demand tables containing projections for the period 2004 - 2010. The basic assumptions with respect to the macro-economic variables (from Global Insight) are presented in Table 1:

Table 1: Macro economic variables for baseline projections.

		2004	2005	2006	2007	2008	2009	2010
Exchange Rate	Rand/$	700	753	788	836	878	913	940
Population	Millions	45.1	44.9	44.7	44.3	43.9	43.4	42.9
Income per capita	Rand/head	15261	15657	16002	16402	16698	17114	17559
Inflation index	1990=100	192	198	205	211	215	221	229

By far the most important crop in South Africa, both in terms of area devoted to production and in supplying the staple for the population is maize (corn). White maize is mostly consumed by people, whereas the yellow maize is fed to livestock. Although the FAPRI projections of world prices are relatively flat, the projected weakening of the Rand versus the dollar means that South African maize price rises significantly. This leads to an increase in area planted, and production as shown in Figure 1.

Figure 1: Baseline projections of maize production in South Africa (million tonnes).



Higher prices cause consumption to fall, however. The weak Rand means that more maize is exported. Developments in the maize market impact on other sectors, with the area of wheat and sorghum falling. The rising price of maize increases the costs of feeding the countries livestock and this largely offsets the impact of higher output prices in those sectors in the baseline projections.

In reality, the assumptions underlying the baseline are certain to be violated, and so actual market outcomes will deviate from the projections presented in the supply-and-use tables. Therefore, the usefulness of the baseline projections is not to predict the future but rather to analyze the impact of a range of "what if" questions on the baseline projections. For example: "What if the exchange rate stays constant at a level of 700 SA cent/ US$ until 2010?" This scenario can be simulated in the model and then be analyzed by means of presenting the deviation (as a result of the scenario) from the baseline.

Proposed Further Research Contacts Between UP and FAPRI

It is hoped that in addition to the program outlined above, that further funding will be obtained in order to continue the educational exchange. For staff members from Missouri that would mean traveling to South Africa to lecture at the University, and also to provide support to the ongoing modeling efforts there. The University of Pretoria has been successful in securing funding for the continuation of the econometric modeling initiative and to undertake complimentary farm level modeling.

It is hoped that the relationship can be maintained for the further development of the econometric model and the construction of farm models. This would involve continued exchanges of staff between Pretoria and Columbia. Projections from the FAPRI models for world prices will be supplied to the South African partners.

The South African team is also proposing to expand their econometric models to incorporate the fruit, vegetable and wine sectors. FAPRI will assist with this, both through staff in Columbia and partners at the Arizona State University. Assistance on the development of a model for bioenergy will also be provided.

In addition to the modeling work, FAPRI is also investigating the possibility of other joint research projects with University of Pretoria. One such project involves the impacts of production of genetically modified varieties of corn.

It is hoped that through these linkages there can continue to be the development of skills in Columbia and Pretoria, and the generation of more collaborative research projects. It is envisioned that there should be joint academic output in the form of presentations and papers for both academic and non-academic audiences.

Appendix 1: Baseline results from South African Model

Cereals	2004	2005	2006	2007	2008	2009	2010
White Maize				Thousand hectares			
White maize area harvested	1666.28	1757.75	1782.91	1792.88	1814.10	1836.21	1857.97
				t/ha			
White maize average yield	2.78	3.00	3.01	3.02	3.02	3.02	3.02
				Thousand tons			
White maize production	4636.37	5276.27	5372.52	5412.14	5480.72	5546.36	5608.04
White maize feed consumption	481.05	418.00	371.58	364.85	364.53	375.41	390.48
White maize human consumption	3841.75	3771.97	3715.84	3673.14	3640.30	3608.36	3599.75
White maize domestic use	4647.80	4514.97	4412.42	4363.00	4329.84	4308.78	4315.23
White maize ending stocks	1118.50	918.37	850.64	809.88	787.21	784.28	801.94
White maize imports	0.00	54.90	60.73	57.52	51.57	47.58	46.32
White maize exports	765.07	1016.33	1088.56	1147.42	1225.13	1288.08	1321.47
				R/ton			
White maize producer price	1120.73	1270.37	1374.88	1442.97	1484.42	1522.36	1561.06
Maize meal retail price	437.09	461.22	481.45	497.30	507.87	521.80	538.50
Yellow Maize				Thousand hectares			
Yellow maize area harvested	934.31	1175.39	1249.80	1283.00	1296.87	1300.36	1299.36
				t/ha			
Yellow maize average yield	3.10	3.07	3.08	3.10	3.11	3.12	3.14
				Thousand tons			
Yellow maize production	2894.09	3608.68	3853.55	3972.76	4032.72	4060.67	4074.59
Yellow maize feed consumption	2951.85	3040.50	3174.53	3240.10	3288.70	3322.77	3351.81
Yellow maize human consumption	237.89	252.62	263.65	266.02	267.10	266.05	264.23
Yellow maize domestic use	3371.74	3475.12	3620.18	3688.12	3737.80	3770.82	3798.04
Yellow maize ending stocks	511.92	677.85	784.38	832.83	856.38	865.63	868.88
Yellow maize exports	160.94	248.80	382.57	479.87	509.27	518.61	515.15
Yellow maize imports	374.50	281.17	255.72	243.68	237.90	238.02	241.85
				R/ton			
Yellow maize producer price	1211.12	1252.12	1257.57	1298.42	1326.16	1371.12	1425.23
Total Maize				Thousand hectares			
Maize area harvested	2600.59	2933.14	3032.71	3075.88	3110.97	3136.57	3157.33
				Thousand tons			
Maize production	7530.47	8884.95	9226.07	9384.90	9513.44	9607.02	9682.63
Maize feed consumption	3432.90	3458.50	3546.11	3604.95	3653.23	3698.18	3742.29
Maize human consumption	4079.64	4024.59	3979.48	3939.16	3907.40	3874.42	3863.98
Maize domestic use	8019.53	7990.09	8032.60	8051.11	8067.63	8079.60	8113.27
Maize Ending stocks	1630.42	1596.22	1635.01	1642.71	1643.59	1649.92	1670.83

	2004	2005	2006	2007	2008	2009	2010
Cereals (cont.)							
Wheat				Thousand hectares			
Wheat summer area harvested	451.52	436.50	423.54	412.70	405.02	397.63	388.60
Wheat winter area harvested	380.28	434.97	434.71	438.15	440.57	442.74	443.61
				t/ha			
Wheat average yield	2.29	2.31	2.34	2.36	2.38	2.41	2.43
				Thousand tons			
Wheat production	1904.27	2015.44	2004.88	2007.45	2014.76	2021.94	2021.71
Wheat feed consumption	90.41	93.07	91.33	91.57	91.16	91.72	92.90
Wheat human consumption	2527.30	2555.64	2570.16	2579.48	2584.10	2591.64	2600.88
Wheat domestic use	2642.72	2673.71	2686.48	2696.05	2700.25	2708.36	2718.78
Wheat ending stocks	524.10	578.41	622.16	661.63	692.84	720.98	748.09
Wheat exports	0.00	0.00	8.75	33.12	46.15	57.92	65.65
Wheat imports	799.40	712.58	734.11	761.18	762.87	772.49	789.84
				R/ton			
Wheat producer price	1589.22	1651.17	1728.56	1802.89	1861.80	1924.03	1987.05
White bread retail price	428.19	445.86	463.09	478.91	490.72	505.57	522.50
Sorghum				Thousand hectares			
Sorghum area harvested	115.35	114.50	112.50	109.97	107.11	104.24	100.55
				t/ha			
Sorghum average yield	2.19	2.43	2.44	2.45	2.47	2.48	2.49
				Thousand tons			
Sorghum production	252.16	278.10	274.72	269.97	264.33	258.62	250.77
Sorghum feed consumption	50.61	50.65	48.73	48.14	46.62	46.26	45.92
Sorghum human consumption	163.95	197.48	196.51	195.41	194.57	193.48	192.33
Sorghum domestic use	224.55	258.14	255.24	253.55	251.19	249.74	248.25
Sorghum ending stocks	45.69	65.55	64.72	63.40	61.85	60.51	58.79
Sorghum net exports	20.92	0.11	20.31	17.73	14.69	10.22	4.24
				R/ton			
Sorghum producer price	975.02	1046.38	1113.91	1174.10	1230.46	1279.48	1333.75

Oilseeds	2004	2005	2006	2007	2008	2009	2010
Sunflower				Thousand hectares			
Sunflower area harvested	531.22	688.74	614.26	629.73	628.98	632.82	631.51
				t/ha			
Sunflower average yield	1.17	1.30	1.31	1.32	1.32	1.33	1.33
				Thousand tons			
Sunflower production	622.86	898.02	805.68	828.92	831.25	839.07	839.53
Sunflower crush	739.39	749.48	745.02	748.37	750.78	752.64	753.29
Sunflower domestic use	751.39	761.48	757.02	760.37	762.78	764.64	765.29
Sunflower ending stocks	219.75	305.87	276.27	282.23	281.73	283.66	284.27
Sunflower net imports	164.29	-50.42	-78.26	-62.59	-68.97	-72.50	-73.62
				R/ton			
Sunflower producer price	2146.74	1913.27	2110.77	2195.01	2284.02	2360.16	2419.54
Sunflower Cake				Thousand tons			
Sunflower Cake Production	310.55	314.78	312.91	314.32	315.33	316.11	316.38
Sunflower Cake consumption	255.67	251.19	270.33	281.02	296.69	309.67	321.58
Sunflower Cake Change in Stocks	71.19	72.40	71.43	69.86	69.65	69.65	69.81
Sunflower Cake Net Imports	16.32	8.81	28.85	36.56	51.01	63.21	75.01
				R/ton			
Sunflower Cake Price	1404.22	1437.97	1507.58	1614.09	1659.03	1710.58	1764.31
Soybean				Thousand hectares			
Soybean area harvested	121.94	133.06	130.01	130.73	131.43	131.95	131.93
				t/ha			
Soybean average yield	1.52	1.70	1.70	1.71	1.72	1.72	1.73
				Thousand tons			
Soybean production	185.23	225.65	221.32	223.39	225.44	227.20	228.01
Soybean crush	30.48	39.90	43.23	44.45	44.93	45.10	45.09
Soybean feed consumption (full fat)	153.52	166.95	173.19	181.89	188.98	197.43	206.80
Soybean domestic use	245.00	267.84	277.42	287.34	294.91	303.53	312.89
Soybean ending stocks	49.78	57.83	60.31	60.19	59.04	58.07	57.69
Soybean net imports	66.26	50.25	58.58	63.83	68.32	75.36	84.50
				R/ton			
Soybean producer price	1890.82	1833.15	1963.30	2076.88	2160.61	2236.02	2306.38
Soybean Cake				Thousand tons			
Soybean Cake Production	24.39	31.92	34.59	35.56	35.94	36.08	36.08
Soybean Cake consumption	526.67	560.47	575.46	596.04	614.72	639.17	667.25
Soybean Cake Imports	502.28	528.55	540.88	560.48	578.78	603.09	631.17
Soybean Cake Price	1893.94	1877.01	2013.26	2134.47	2223.07	2302.36	2377.48

Dairy	2004	2005	2006	2007	2008	2009	2010
				Thousand head			
Number of dairy cows	731.95	728.45	720.61	714.59	707.89	701.10	694.52
Fluid Milk				Thousand liters			
Fluid milk production	1,971,719	1,977,629	1,980,316	1,984,312	1,985,592	1,987,253	1,989,196
Fluid milk fresh consumption	1,172,289	1,178,943	1,183,738	1,189,113	1,193,895	1,199,249	1,205,589
				Thousand tons			
Fluid milk production (tons)	2017.07	2023.11	2025.86	2029.95	2031.26	2032.96	2034.95
Fluid milk fresh consumption (tons)	1199.25	1206.06	1210.96	1216.46	1221.35	1226.83	1233.32
				c/liter			
Fluid milk producer price	213.16	223.51	234.31	244.57	252.10	263.09	275.72
Cheese				Thousand tons			
Cheese production	34.01	34.21	34.12	34.08	33.83	33.57	33.21
Cheese imports	5.09	5.01	4.90	4.84	4.77	4.85	5.04
Cheese Domestic Use	38.90	38.69	38.46	38.33	38.01	37.87	37.78
Cheese Exports	0.42	0.53	0.57	0.60	0.61	0.58	0.50
Cheese Ending stock	3.79	3.79	3.78	3.77	3.75	3.72	3.68
				c/kg			
Cheese consumer price	4397.78	4650.03	4869.09	5079.74	5232.50	5480.45	5775.09
Butter				Thousand tons			
Butter production	9.12	8.94	8.73	8.56	8.36	8.13	7.91
Butter imports	2.57	2.52	2.47	2.41	2.36	2.34	2.34
Butter Domestic Use	10.46	10.24	9.94	9.63	9.29	9.02	8.77
Butter Exports	0.99	1.11	1.21	1.31	1.38	1.42	1.44
Butter Ending stock	2.99	3.10	3.16	3.20	3.25	3.28	3.32
				c/kg			
Butter consumer price	3397.63	3457.54	3524.87	3588.53	3612.33	3669.05	3746.09
Skimmed Milk Powder				Thousand tons			
SMP production	11.81	11.70	11.65	11.60	11.52	11.38	11.21
SMP imports	6.84	6.82	6.81	6.82	6.82	6.86	6.93
SMP Domestic Use	11.72	11.72	11.40	11.17	10.91	10.85	10.95
SMP Exports	6.63	6.93	7.30	7.47	7.63	7.57	7.31
SMP Ending stock	2.12	1.99	1.75	1.54	1.34	1.17	1.04
				c/kg			
SMP consumer price	4306.95	4530.21	4834.79	5117.64	5340.18	5596.24	5853.93
Whole Milk Powder				Thousand tons			
WMP production	12.85	12.98	13.22	13.49	13.67	13.91	14.16
WMP imports	1.24	1.24	1.24	1.24	1.25	1.28	1.33
WMP Domestic Use	12.74	13.04	13.26	13.53	13.72	14.00	14.30
WMP Exports	1.17	1.18	1.19	1.19	1.19	1.19	1.18
WMP Ending stock	2.71	2.71	2.72	2.74	2.74	2.75	2.76

Livestock	2004	2005	2006	2007	2008	2009	2010
				R/ton			
Cattle feed cost costs	1173.33	1291.20	1307.28	1354.90	1387.05	1434.16	1489.30
Chicken feed cost costs	1372.74	1471.02	1507.94	1569.26	1610.85	1665.03	1726.25
Egg feed cost costs	1300.91	1405.33	1434.76	1492.52	1530.20	1581.54	1640.23
Pork feed cost costs	1352.86	1458.79	1490.81	1549.66	1588.46	1641.27	1701.97
				Index			
Cattle input cost cost index	236.64	252.45	258.17	266.48	272.17	280.60	290.76
Chicken input cost cost index	257.62	273.88	281.24	291.86	299.10	308.78	319.95
Egg input cost cost index	263.61	282.06	288.71	299.55	306.70	316.62	328.15
Pork input cost cost index	249.66	265.96	272.65	282.50	289.07	298.24	309.01
Beef				Thousand tons			
Beef production	573.42	575.64	577.88	579.32	580.11	581.33	582.49
Beef imports	66.90	68.88	71.42	74.18	76.00	78.66	81.41
Beef Domestic Use	634.88	639.23	644.21	648.61	651.36	655.44	659.56
Beef Exports	5.44	5.29	5.09	4.89	4.75	4.55	4.34
				c/kg			
Beef average auction price	1124.95	1286.50	1404.51	1508.48	1573.93	1675.47	1788.03
Chicken				Thousand tons			
Chicken production	938.27	952.62	980.57	1007.56	1028.40	1048.31	1067.27
Chicken imports	122.73	125.03	102.53	86.99	76.83	72.01	69.68
Chicken Domestic Use	1057.38	1072.61	1076.89	1087.46	1097.41	1112.23	1128.81
Chicken Exports	3.62	5.04	6.20	7.10	7.82	8.08	8.13
				c/kg			
Chicken producer price	1114.94	1239.50	1371.38	1477.24	1539.11	1630.35	1729.98
Eggs				Thousand tons			
Eggs production	397.91	401.69	405.74	409.88	413.47	417.64	422.26
Eggs imports	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Eggs Domestic Use	395.26	399.09	403.18	407.37	411.00	415.20	419.87
Eggs Exports	2.70	2.66	2.61	2.57	2.54	2.50	2.46
				c/kg			
Eggs producer price	846.02	912.23	958.10	1016.52	1047.63	1115.46	1191.13
Pork				Thousand tons			
Pork production	127.54	126.20	127.29	128.50	129.33	130.54	131.82
Pork imports	11.38	10.47	11.75	12.41	12.94	12.24	11.81
Pork Domestic Use	135.47	133.29	136.05	138.12	139.64	139.92	140.62
Pork Exports	3.45	3.38	2.99	2.79	2.63	2.86	3.00
				c/kg			
Pork producer price	1117.60	1348.58	1468.90	1580.24	1651.41	1770.29	1900.93