

AGENCY FOR INTERNATIONAL DEVELOPMENT WASHINGTON, D. C. 20523 BIBLIOGRAPHIC INPUT SHEET		FOR AID USE ONLY
1. SUBJECT CLASSIFICATION	A. PRIMARY ECONOMICS	
	B. SECONDARY AGRICULTURAL MARKETING	
2. TITLE AND SUBTITLE NEEDS AND OPPORTUNITIES FOR IMPROVED GRAIN MARKETING IN PANAMA		
3. AUTHOR(S) DR. RICHARD PHILLIPS		
4. DOCUMENT DATE MARCH 1973	5. NUMBER OF PAGES 58 PAGES	6. ARC NUMBER ARC PN-338.1731-P562a
7. REFERENCE ORGANIZATION NAME AND ADDRESS KANSAS STATE UNIVERSITY FOOD AND FEED GRAIN INSTITUTE MANHATTAN, KANSAS 66506		
8. SUPPLEMENTARY NOTES (<i>Sponsoring Organization, Publishers, Availability</i>)		
9. ABSTRACT <p>* The study of grain marketing represents an integral part of overall analysis for agricultural sector planning and development in Panama.</p> <p>* The general objective of the study is to identify major long-term needs and opportunities for improved grain marketing in Panama within the setting of balanced development for the total agricultural sector of the country. Specific objectives include the following:</p> <ul style="list-style-type: none"> -Identify patterns of projected demand for grain and grain products. -Develop projections of grain production on potentials by province. -Develop projections of market volumes and distribution patterns. -Identify needed improvements in existing marketing and processing facilities. -Evaluate grain price policies and price support programs as they affect producers, handlers and consumers. -Identify major needs for supporting marketing services. 		
10. CONTROL NUMBER PN-AAA-371	11. PRICE OF DOCUMENT \$4.30	
12. DESCRIPTORS MARKET VOLUME, PRICE POLICY, PRICE SUPPORT, PRODUCERS, HANDLERS, CONSUMERS	13. PROJECT NUMBER	
	14. CONTRACT NUMBER AID/csd-1588	
	15. TYPE OF DOCUMENT RESEARCH STUDY	

NEEDS AND OPPORTUNITIES FOR IMPROVED
GRAIN MARKETING IN PANAMA

EXECUTIVE DIGEST

Prepared By

Dr. Richard Phillips

Prepared for the
AGENCY FOR INTERNATIONAL DEVELOPMENT
AID/csd-1588
Technical Assistance in
Food Grain Drying, Storage, Handling and Transportation
at the
FOOD AND FEED GRAIN INSTITUTE
KANSAS STATE UNIVERSITY
MANHATTAN, KANSAS 66506

Dr. William J. Hoover, Director
Dr. Leonard W. Schruben, Associate Director
Dr. Richard Phillips, Agricultural Economist
Dr. Harry B. Pfost, Agricultural Engineer
Dr. Do Sup Chung, Agricultural Engineer
John R. Pedersen, Entomologist

TABLE OF CONTENTS

	PAGE
I. INTRODUCTION	1
A. Objectives	1
B. Summary of Conditions in Panama	1
C. Role of Grain in Panama's Agriculture	4
II. GRAIN PRODUCTION PATTERNS AND TRENDS	7
A. Rice	7
B. Corn	13
C. Edible Beans	16
D. Grain Sorghum	19
E. Added Potential for Grain Production	20
III. PROJECTED DEMAND AND UTILIZATION PATTERNS	23
A. Projected Volume of Demand	23
B. Balances by Province	26
C. Projected Marketing Patterns	27
IV. NEEDED GRAIN MARKETING SERVICES	29
A. Grain Statistics and Market News	29
B. Grain Price Support Programs	30
C. Regulation of Imports and Retail Prices	30
D. Grain Inspection and Grading	31
E. Marketing Research	31
F. Expanded Marketing Education and Training	31
G. Public Grain Warehousing	32
H. Leasing of Government-Owned Marketing Facilities	32
V. NEEDED GRAIN MARKETING FACILITIES	35
A. Grain Storage Facilities	35
B. Rice Milling Facilities	36
C. Cleaning and Drying Facilities	36
D. Grain Transport Facilities	37
E. Grain Inventories	37
VI. ESTIMATED COSTS AND BENEFITS OF RECOMMENDED PROGRAMS	39
A. Estimated Costs for Recommended Marketing Services	39
B. Estimated Costs for Recommended Facilities and Inventories	39
C. Estimated Benefits from Recommended Marketing Services	41
D. Estimated Benefits from Recommended Marketing Facilities	43
E. Recommended Implementation of Marketing Services	43
F. Recommended Development of the Needed Marketing Facilities	44
G. Recommended Implementation of Inventory Financing Program	44

LIST OF TABLES

	PAGE
Table 1. Production of Rough Rice for Panama, 1958-1972 with Projections to 1980	8
Table 2. Yield of Rice, All Crops, 1958-1972 with Projections to 1980	10
Table 3A. Area Planted with Rice, First Crop, 1960-1972 with Projections to 1980	11
Table 3B. Area Planted with Rice, Second Crop, 1960-1972 with Projections to 1980	12
Table 4. Production of Maize (Shelled) in Panama, 1958-1972 with Projections to 1980	14
Table 5. Yield of Maize, All Crops, 1958-1972 with Projections to 1980	15
Table 6A. Area Planted with Maize, First Crop, 1960-1972 with Projections to 1980	17
Table 6B. Area Planted with Maize, Second Crop 1960-1972 with Projections to 1980	18

I. INTRODUCTION

A. Objectives

- * The study of grain marketing represents an integral part of overall analysis for agricultural sector planning and development in Panama.
- * The Executive Digest summarizes and up-dates the original study made in 1971. The references listed in the margin of the Digest provide chapter and page citation of the complete report.
- * The general objective of the study is to identify major long-term needs and opportunities for improved grain marketing in Panama within the setting of balanced development for the total agricultural sector of the country. Specific objectives include the following:
 - Identify patterns of projected demand for grain and grain products.
 - Develop projections of grain production on potentials by province.
 - Develop projections of market volumes and distribution patterns.
 - Identify needed improvements in existing marketing and processing facilities.
 - Evaluate grain price policies and price support programs as they affect producers, handlers and consumers.
 - Identify major needs for supporting marketing services.

B. Summary of Conditions in Panama

- * Rice is the dominant food crop in the Panamanian diet, and corn and edible beans are relatively important as well. The wheat needed to support bread consumption must be imported. Corn is important for poultry and livestock feeds as well as for human food, but grain sorghum is becoming an increasingly important feed grain.
- * Rice is the major grain crop in most provinces and the dominant crop in the large mechanized farming areas such as those of Chiriquí and Coclé Provinces.

- Except in isolated areas, rice as well as other grains is a rainfed crop.
 - Rice can be grown the year round, and harvest peaks are governed only by the need to time planting and harvest in the relatively dry months.
 - By following the early fall harvest with a winter ratoon, the most skilled producers have learned to grow two crops per year on the same land.
 - Rice is harvested at relatively high moisture contents and must be dried artificially prior to storage and milling.
- * Corn is grown throughout the country, but is relatively most important in the central provinces, particularly Los Santos, Herrera and Panamá.
- Most of the production is of the flint type and about 55 percent of the harvest is used for human food.
 - Corn is grown for both fall harvest (about 60 percent) and for spring harvest (about 40 percent).
 - There are large mechanized corn producers in Panama, but compared to rice, corn is relatively more popular among the small non-mechanized farmers.
- * Edible beans are primarily a winter crop (about 88 percent of the annual production) grown following the fall harvest of rice or corn. Most of the volume is produced by small farmers who have little or no mechanization.
- * Grain sorghum is a new crop for Panama, but the larger mechanized farmers are expanding production rapidly. The crop usually is grown as a winter crop following rice.
- * The long-term production trend has been upward for rice but slightly downward for corn and edible beans. The domestic demand has continued to increase, and in recent years Panama has become more dependent on food grain imports to supplement local production. Sorghum production has not yet made a major impact, and significant volumes of feed grains still must be imported.

- * With the exception of grain sorghum, a large percentage of Panama's grain production is consumed on the farm and does not enter market channels.
 - During the 1971-1972 crop year, for example, only about 68 percent of the rice and 33 percent of the corn production was sold by farmers.
 - However, with the increasing relative importance of production on commercial farms, the percentages entering marketing channels are increasing each year.

- * Grain marketing is accomplished both through private channels and by the Government through the Dirección Nacional de Mercadeo (formerly Instituto de Fomento Economico).
 - Most of the domestic production moves through private channels so long as market prices to farmers remain above support levels, but substantial quantities are delivered to the Government when free market prices fall to support levels.
 - The Dirección Nacional de Mercadeo is the sole agency for importing rice and feed grains.

- * In addition to its direct marketing functions, the Government performs regulatory functions, including control of consumer prices for grain products, as well as service functions such as grain inspection and grading, market news and research and education in grain marketing.

- * Rice millers are a dominant factor in Panama's private grain trade, controlling most of the commercial capacity for cleaning, drying and storage of grain.
 - Grain elevators and other specialized grain operators are uncommon.
 - Local assembly functions are performed by the millers, through agents and direct representatives, and by local dealers and merchant truckers.

- * The major consumer markets for grain products are in Panamá and Colón in the central section of the country. The major production areas are located some distance from these centers.

- For example, the largest and fastest growing production area is in Chiriquí, the western most province on the Pacific side of the Isthmus.
- There are no railroads serving the area, so the grain must be transported by truck or by ship.
- Because of problems in receiving and shipping by water, most of the transport from the west moves by truck.
- Shipments from Darién Province in the far eastern section must move by ship to Panamá because the highway to this area has not been completed.

* The major terminal points for grain storage, handling and processing in Panama are (1) David in Chiriquí Province, (2) Penonomé in Coclé Province, (3) Soná and Santiago in Veraguas Province and (4) Panamá. The terminal facilities in Panamá are located adjacent to the major market, while those at the other locations are located adjacent to major production areas. The total grain storage capacity at the terminal market locations is as follows:

- David, 645,000 quintals
- Penonomé, 370,000 quintals
- Panamá, 260,000 quintals
- Soná, 200,000 quintals
- Santiago, 130,000 quintals

C. Role of Grain in Panama's Agriculture

- * Panama produces a wide variety of crop and livestock products, but the nation's agriculture is dominated by rice and other grains.
 - Some 35 percent of the active farm land is devoted to rice, about 28 percent to corn and grain sorghum and 5 percent to edible beans.
 - Clearly, development programs which increase the efficiency and profitability of grain production have a major impact on the primary agricultural sector as a whole.
- * Grain likewise is dominant in the country's associated agricultural industry.

- Rice milling represents one of Panama's major industries in terms of numbers employed and value added.
 - Grain creates the major demand for seed, fertilizer, chemicals and other farm inputs.
 - Grain provides major support for large numbers of private truckers, food handlers and others as well as for those directly involved in drying, storage, milling and handling of grain.
- * Strides have been made over the past ten years in increasing grain yields and production as well as in increasing the capacity and efficiency of the supporting agricultural industry. Still, the need exists for expanding output even more over the next ten years.
- The demand for food grains is growing at the rate of some 23 million pounds per year, grain equivalent, and that for feed grain at the rate of about 10 million pounds per year.
 - In addition, the fraction of the crop which must be handled through marketing channels is increasing by about 1.5 percent each year.
- * Panama has the basic human and natural resources needed to meet the challenges of grain production and marketing.
- Additional good lands are available for grain production in all provinces except Veraguas, and for the country as a whole amount to some 300,000 hectares, substantially more than the total now devoted to grain production.
 - Potentials are good for continued increases in yields.
 - The grain marketing structure is basically sound, and capable of making the adjustments needed to meet the development challenge.
- * The needed development of grain production and marketing will not come automatically. Government policies and programs must be carefully coordinated. Resource requirements must be identified in specific terms, and plans must be developed to insure that these resources will be brought to bear effectively. This report outlines key components of such a development program for Panama.

II. GRAIN PRODUCTION PATTERNS AND TRENDS

- * The patterns and trends in grain production can be identified quite clearly from the annual statistical publications of the Bureau of Statistics and Census.
 - Plantings, yields and production of the major grains are reported annually by province.
 - Separate figures are reported for the first crop (fall harvest) and second crop (spring harvest).
 - Even though some downward adjustments were made in the remote provinces of Bocas del Toro and Darién following the 1970 agricultural census, it is believed that the reported figures are quite accurate, generally speaking.

- * The units of measure used in Panama are quintals (one hundred pounds), hectares and quintals per hectare.
 - Rice is reported in terms of rough rice (paddy).
 - Corn and beans are reported on a shelled basis.
 - Rice, corn and grain sorghum are reported on the basis of 14 percent moisture and no foreign material.
 - Edible beans are reported on the basis of 12 percent moisture and 2 percent foreign material.

A. Rice

- * Panama's rice production for the crop years 1958-59 through the estimates for 1972-73 are shown together with projections through 1980-81 in Table 1. The projections are based upon extensions of the exponential trends within each province.
 - Rice production for the country as a whole has been increasing at the average rate of about 76,500 quintals per year.
 - Significant quantities of rice are produced in all provinces, but Chiriquí and Coclé are rapidly becoming the major rice producing centers. Together the two provinces represented 72 percent of the national production in 1972-73; if present trends continue, these provinces will produce 80 percent of the total rice production by 1979-80.
 - Rice production has exhibited a downward long-term trend in all other provinces. The downward trend is most striking in Veraguas (14,000 qq/year) and in Los Santos (12,000 qq/year).

CUADRO 1. PRODUCCION DE ARROZ EN CASACA POR PANAMA
POR AÑO 1958 - 1972, CON PROYECCIONES A 1980

(CUINTALES)

EXPONENT IS 1.40

YEAR	PROVINCIA									
	BOCAS DEL		LOS						PANAMA	
	TORO	CHIRIQUI	VERAGUAS	HERRERA	SANTOS	CUCLÉ	PANAMÁ	COLÓN	GARIÉN	TOTAL
1958	9400	574900	702200	318200	366400	174200	249300	47700	60500	2502800
1959	3500	691700	789200	230000	326600	180500	222000	48100	89500	2581100
1960	4200	523400	657500	223700	286000	160300	184000	36300	42400	2117800
1961	6800	646100	634400	206300	325900	182900	271100	57100	70300	2400900
1962	6100	639700	606000	250800	313600	217500	255700	59400	69300	2418500
1963	7900	637600	567500	266400	338900	190700	272200	61800	107300	2450300
1964	17900	677500	689300	357400	394500	199600	285000	82800	112200	2816200
1965	9300	878600	940700	360100	265700	318900	347200	79500	139400	3339400
1966	9000	767200	814200	289900	287300	276800	408600	79400	157000	3088800
1967	9000	1035500	893100	272200	270300	295900	334900	69100	147300	3327300
1968	5400	1117600	833700	376200	279800	514900	273400	68400	125000	3594400
1969	6800	1368500	761000	260100	281900	559900	223100	56700	125000	3643000
1970	4200	1219500	397200	136100	177800	672300	144400	30600	26300	2808400
1971	4200	1377400	400400	139800	163700	702600	153900	34800	26300	3003100
1972	7000	1748000	381400	110300	176400	567600	152300	42500	27000	3212500
1973	6385	1627482	527137	182779	170815	717035	202799	50632	75429	3560493
1974	6235	1732945	505453	172183	153829	772640	195421	49683	73489	3661878
1975	6082	1640920	483252	161355	136439	829571	187868	48712	71502	3765681
1976	5925	1951324	460552	150243	118658	887781	180145	47719	69471	3871818
1977	5763	2064076	437369	138915	100498	947230	172258	46705	67396	3980212
1978	5602	2179105	413719	127358	81971	1007980	164212	45670	65280	4090797
1979	5435	2296349	389612	115579	63088	1069656	156010	44616	63123	4203508
1980	5266	2415745	365063	103584	43858	1132640	147658	43542	60926	4318251
YBAR	7380.00	926880.00	671186.63	253166.63	283653.31	347640.00	251806.63	56953.33	88320.00	
s	-34.86	24546.84	-5047.04	-2466.16	-3953.48	12942.39	-1717.08	-220.78	-451.65	
FSC	0.0193	0.8917	0.1610	0.1800	0.6769	0.8563	0.1023	0.0344	0.0193	

SOURCE:

ESTADISTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCION DE ARROZ, MAIZ Y FRIJOL. 1958-1972. DIRECCION DE ESTADISTICA Y CENSO.

- The shifting rice production patterns reflect several things, perhaps the most important of which is the type of farms. Chiriquí and Coclé are characterized by relatively large mechanized grain farms. Small traditional farms represent the dominant pattern in other areas.
- The downward adjustments during and following the 1970 agricultural census are particularly apparent for Darién. Assuming that these figures are more accurate than those for the prior years, the projections for this province may be somewhat high. On the other hand, once the highway to the area is completed (roughly 1978), production in Darién can be expected to increase rapidly.

* Reported and projected average rice yields over the comparable time period by province are shown in Table 2. The patterns and trends in yields parallel those for rice production.

- For the country as a whole rice yields are increasing at the average annual rate of 0.381 quintals per hectare.
- Most of the increase in national average yields is contributed by Chiriquí (1.70 quintals per hectare) and Coclé (1.18 quintals per hectare). Average yields are increasing slightly in Colón, but are decreasing in all other provinces.
- The average annual decline in rice yields in these other provinces ranges up to more than 0.6 quintals per hectare for Herrera, Veraguas and Darién.
- If the present trends continue, by 1980 rice yields in Chiriquí will be nearly twice the national average, and nearly four times those in Veraguas, Herrera and Los Santos.

* The corresponding reported and projected plantings of rice in Panama are shown in Table 3A and 3B. The plantings are shown separately for the first (summer) and second (winter) crops. The patterns and trends in rice plantings also are very much the same as those for rice production.

- Total rice plantings for the country as a whole have increased at an average rate of slightly more than 1000 hectares per year.
- Plantings have been increasing significantly in Chiriquí (about 800 hectares per year) and Coclé (more than 1000 hectares per year), remaining stable in Bocas del Toro, and declining in all other provinces.

CUADRO 2. RENDIMIENTO DE ARROZ, TODAS LAS SIEMBRAS
POR AÑO 1958 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 10 POUNDS POR HECTAREA)

EXPONENT IS 1.00

YEAR	PROVINCIA										EN LA REPUBLICA		
	BOCAS DEL		LOS								TOTAL	PRIMERA	SEGUNDA
	TORO	CHIRIQUÍ	VERAGUAS	HERRERA	SANTOS	COCLÉ	PANAMÁ	COLÓN	DARIÉN				
1958	188	250	300	354	253	180	257	144	275	263	267	228	
1959	175	288	317	288	233	170	224	172	298	265	274	197	
1960	84	249	264	280	244	184	186	145	265	238	244	213	
1961	170	278	228	246	263	162	228	178	390	239	248	201	
1962	162	292	208	292	245	200	244	193	330	243	245	227	
1963	99	310	201	283	229	183	220	182	325	237	238	228	
1964	163	270	227	275	256	161	180	267	303	233	234	223	
1965	155	327	251	284	178	214	204	194	310	251	256	209	
1966	150	283	221	244	211	192	240	158	314	235	238	210	
1967	150	371	236	262	218	207	195	168	313	257	257	254	
1968	135	396	260	303	220	264	175	175	320	280	278	284	
1969	136	436	240	258	237	277	170	155	320	290	294	258	
1970	60	429	189	197	202	350	180	146	202	292	287	324	
1971	60	462	203	233	205	370	179	158	202	315	305	370	
1972	100	498	168	187	196	258	145	193	208	283	283	283	
1973	89	479	185	211	197	319	160	172	244	292	287	316	
1974	84	496	179	204	193	331	155	172	238	296	290	325	
1975	79	513	173	198	190	343	150	172	232	300	293	334	
1976	74	530	167	191	186	355	144	172	226	303	296	342	
1977	70	547	161	184	182	367	139	172	220	307	299	351	
1978	65	564	155	177	179	378	134	173	214	311	302	359	
1979	60	581	148	170	175	390	129	173	208	315	305	368	
1980	55	598	142	164	171	402	123	173	202	319	308	377	
YBAR	128.47	342.60	234.20	265.73	226.13	224.80	202.33	171.07	291.07	261.40	263.20	247.27	
B	-4.91	17.00	-6.12	-6.81	-3.66	11.81	-5.26	0.12	-6.01	3.81	2.90	8.53	
RSQ	0.2799	0.8476	0.4666	0.5357	0.4398	0.6436	0.5444	0.0007	0.2568	0.4483	0.3508	0.6100	

SOURCE:

ESTADÍSTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAÍZ Y FRIJOL. 1958-1972. DIRECCIÓN DE ESTADÍSTICA Y CENSO.

CUADRO 3A. SUPERFICIE SEMBRADA DE ARROZ, PRIMERA SIEMBRA
 POR AÑO 1960 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 100 HECTÁREAS)

EXPLICIT IS 1.00

YEAR	PROVINCIA									
	BOCAS DEL			LOS				PANAMA		
	TGRO	CHIRIQUI	VERAGUAS	HERRERA	SANTOS	CUCLÉ	PANAMÁ	COLÓN	DARIÉN	TOTAL
1960	3	151	226	71	94	77	74	23	16	737
1961	2	162	247	70	98	98	89	29	18	813
1962	4	181	266	77	106	100	82	28	21	865
1963	7	171	256	66	127	95	101	32	33	908
1964	9	221	274	118	127	112	126	39	36	1062
1965	5	232	358	116	117	135	127	40	43	1173
1966	5	226	356	113	120	131	132	49	49	1181
1967	5	248	369	97	105	127	118	40	46	1155
1968	3	222	310	116	114	172	110	38	39	1123
1969	4	261	300	95	102	186	90	36	38	1112
1970	5	226	197	63	68	178	63	19	12	831
1971	5	213	186	53	65	179	67	22	12	801
1972	5	266	216	52	75	208	86	22	12	942
1973	5	268	257	77	80	211	90	30	26	1044
1974	5	276	255	76	77	221	89	29	26	1054
1975	5	284	252	74	74	231	88	29	25	1062
1976	5	291	250	73	71	242	87	28	25	1072
1977	5	299	248	72	69	252	86	28	25	1084
1978	5	307	245	70	66	262	85	28	24	1092
1979	5	315	243	69	63	273	84	27	24	1103
1980	6	323	240	67	60	283	83	27	24	1113
YBAR	4.77	213.85	274.08	86.69	101.38	138.23	97.31	32.08	28.77	
S	0.05	7.76	-2.41	-1.38	-2.99	10.35	-1.03	-0.37	-0.37	
RSQ	0.0143	0.6687	0.0234	0.0489	0.3070	0.9264	0.0293	0.0248	0.0109	

SOURCE:

ESTADÍSTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAÍZ Y FRIJOL. 1960-1972. DIRECCIÓN DE ESTADÍSTICA Y CENSO.

CUADRO 38. SUPERFICIE SEMBRADA DE ARROZ, SEGUNDA SIEMBRA
POR AÑO 1960 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 100 HECTAREAS)

EXPONENT IS 1.00										
PROVINCIA										
YEAR	BOCAS DEL			LOS				PANAMA		
	TORO	CHIRIQUI	VERAGUAS	HERRERA	SANTOS	COCLÉ	PANAMA	COLÓN	DARIÉN	TOTAL
1960	2	59	21	9	23	10	25	2	0	151
1961	2	70	30	14	27	15	30	3	0	191
1962	2	38	25	9	22	9	23	3	0	141
1963	1	35	26	8	21	9	23	2	0	125
1964	2	30	30	12	26	12	32	1	1	146
1965	1	37	17	11	32	14	43	1	2	158
1966	1	45	15	6	16	13	38	1	1	154
1967	1	31	10	7	19	16	54	1	1	140
1968	1	60	10	8	13	23	46	1	1	164
1969	1	53	9	6	17	16	41	1	1	145
1970	2	58	13	6	20	14	14	2	1	150
1971	2	85	11	7	15	12	19	0	1	192
1972	2	85	11	7	15	12	19	0	1	192
1973	1	69	6	5	14	16	30	0	1	145
1974	1	71	4	5	13	16	30	0	2	142
1975	1	73	3	5	12	17	30	0	2	143
1976	1	76	1	4	11	17	29	0	2	141
1977	1	78	0	4	10	17	29	0	2	141
1978	1	80	0	3	9	18	29	0	2	142
1979	1	83	0	3	9	18	29	0	2	145
1980	1	85	0	3	8	18	29	0	2	146
YBAR	1.54	52.77	17.38	8.46	20.46	15.46	31.31	1.58	0.77	
S	-0.01	2.30	-1.65	-0.42	-0.92	0.34	-0.19	-0.19	0.09	
RSQ	0.0068	0.2229	0.6524	0.4330	0.4196	0.1278	0.0036	0.5733	0.3684	

SOURCE:

ESTADÍSTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAÍZ Y FRIJOL. 1960-1972. DIRECCIÓN DE ESTADÍSTICA Y CENSO.

- The average downward trend in total rice plantings has been most pronounced (more than 300 hectares per year) in Los Santos and Veraguas Provinces.
- It is clear from Tables 3A and 3B that rice is primarily grown as a first (summer) crop in all provinces. There has been no significant shift in this pattern over time. Over one-half the country's total second crop rice is grown in Chiriquí Province.

B. Corn

- * Reported and projected figures for corn production in Panama are shown in Table 4. As in the case of those for rice, the corn projections are based upon extension of the exponential trends over the historical period.
 - Panama's total corn production dropped to about 1.1 million quintals in 1972-73, down from a high of nearly 2 million quintals in 1967-68. The short harvest was due in part to drought conditions, especially in Coclé. Still, the long-term trend is downward.
 - Total annual corn production has been decreasing at an average annual rate of about 17,500 quintals. This is true even though production in each of three provinces (Chiriquí, Coclé and Darién) has increased by more than 2,500 quintals per year.
 - The annual decrease in corn production has averaged more than 6,000 quintals in Panamá Province, more than 5,000 quintals in Colón and Los Santos Provinces, and more than 4,000 quintals in Herrera and Veraguas Provinces.
 - Corn production is less concentrated than that of rice. In 1971-72 Chiriquí and Los Santos produced 36 percent of the total corn in the nation, and, if present trends continue, will produce 39 percent of the total by 1979-80.
- * Average yields of corn for the nation as a whole indicate a moderate downward long-term trend, as shown in Table 5. The average annual decrease in yield is about 0.12 quintals per hectare. The same average decline has occurred in the yields of first crop and second crop plantings.
 - Average corn yields have been increasing in Coclé, Los Santos and Chiriquí, but decreasing in all other provinces. The average annual increase has been greatest in Coclé (0.367 quintals per hectare).

CUADRO 4. PRODUCCION DE MAIZ EN GRANO POR PANAMA
POR AÑO 1958 - 1972, CON PROYECCIONES A 1980

(QUINTALES)

EXPONENT IS 0.80

YEAR	PROVINCIA									
	BOCAS DEL			LOS				PANAMA		
	TORO	CHIRIQUI	VERAGUAS	HERRERA	SANTOS	COCLE	PANAMA	COLÓN	DARIEN	TOTAL
1958	7800	341100	332900	212800	358800	76400	216900	121500	41300	1709500
1959	4000	311100	370900	160100	327400	103400	240200	146700	40200	1704000
1960	7800	264500	276500	175400	298000	75500	152600	23000	22200	1295500
1961	3900	422700	312300	176800	305400	93900	208600	47600	59600	1631000
1962	9300	334800	255900	148500	351000	118000	207500	48600	61200	1584800
1963	8300	469600	332200	174500	311000	85900	156100	60000	74100	1672200
1964	14800	398500	412600	191200	355800	85900	200700	57100	91000	1805600
1965	6900	444700	396600	169800	366200	115800	200500	44000	115600	1860100
1966	8000	460500	364700	221000	349200	103500	218500	44700	92900	1860000
1967	11100	513700	419400	170500	315000	140000	252200	43700	93900	1959500
1968	9600	433700	336800	183800	372300	127200	236400	54100	92200	1646100
1969	9600	475600	441200	201000	338200	120400	204300	50900	87900	1929100
1970	4800	334600	191300	113000	239600	157000	161100	26600	62200	1230200
1971	4800	309700	227700	114900	233800	123700	103300	17300	62200	1197400
1972	5300	298900	213200	99700	247900	88500	85000	22200	70700	1111400
1973	7452	411196	295892	137616	281658	126351	141573	13601	93505	1508844
1974	7439	413855	292545	133872	277568	128619	136617	9067	96023	1495605
1975	7426	416483	289238	130172	273525	130861	131718	4586	98511	1482520
1976	7413	419082	285967	126513	269527	133078	126874	155	100971	1469580
1977	7401	421654	282730	122892	265571	135272	122080	0	103406	1461006
1978	7388	424200	279526	119307	261654	137443	117334	0	105817	1452669
1979	7376	426722	276352	115756	257775	139595	112633	0	108204	1444413
1980	7364	429221	273207	112237	253930	141726	107575	0	110570	1436230
YEAR	7566.66	387580.00	325613.31	170866.63	317986.63	106206.63	185593.31	53866.66	71146.63	
B	-28.39	5822.77	-7328.13	-8198.28	-8957.14	4966.81	-10853.56	-9427.95	5512.72	
PSQ	0.0005	0.0330	0.0515	0.3049	0.2238	0.2213	0.2447	0.4628	0.2882	

SOURCE:

ESTADISTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCION DE ARROZ, MAIZ Y FRIJOL. 1958-1972. DIRECCION DE ESTADISTICA Y CENSO.

CUADRO 5. RENDIMIENTO DE MAÍZ, TUCAS LAS SIEMBRAS
POR AÑO 1958 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 10 PUNDS POR HECTAREA)

EXPONENT IS 1.00

YEAR	PROVINCIA										EN LA REPUBLICA		
	BUCAS DEL			LOS							TOTAL	PRIMERA	SEGUNDA
	TORO	CHIRIQUÍ	VERAGUAS	HERRERA	SANTOS	COCLÉ	PANAMÁ	COLÓN	DARIÉN				
1958	260	216	163	276	197	127	161	202	258	191	199	181	
1959	133	202	178	258	191	162	209	237	201	199	213	180	
1960	130	162	170	244	192	148	132	70	123	168	172	161	
1961	130	196	175	210	179	144	149	154	199	178	184	169	
1962	133	208	145	248	204	216	174	162	191	191	190	192	
1963	126	228	184	192	181	141	125	162	190	178	177	178	
1964	148	186	188	220	204	131	136	178	228	183	179	188	
1965	138	209	172	193	187	148	127	122	236	176	173	182	
1966	125	203	146	214	193	125	138	121	226	172	164	183	
1967	139	194	161	181	185	161	150	106	261	174	176	171	
1968	137	202	150	245	200	153	172	146	243	184	188	179	
1969	137	221	177	234	210	143	140	121	244	188	191	184	
1970	80	212	152	198	212	308	128	116	78	178	191	155	
1971	80	196	163	230	196	238	161	124	78	175	189	157	
1972	88	209	146	178	185	118	125	101	131	157	157	157	
1973	83	209	154	192	199	194	133	98	153	170	173	165	
1974	77	209	153	188	199	197	131	92	148	169	172	164	
1975	71	210	152	185	200	201	129	87	143	168	171	163	
1976	64	211	150	181	200	205	127	81	138	166	170	161	
1977	58	211	149	177	201	208	125	76	133	165	168	160	
1978	52	212	148	174	202	212	123	70	129	164	167	159	
1979	46	213	146	170	202	216	121	65	124	163	166	156	
1980	40	213	145	166	203	219	119	59	119	162	165	157	
YEAR	132.27	202.93	165.00	221.40	194.40	164.33	146.47	142.07	192.47	179.47	182.87	174.47	
B	-6.18	0.70	-1.34	-3.66	0.55	3.67	-1.96	-5.53	-4.91	-1.19	-1.21	-1.19	
RSQ	0.4409	0.0398	0.1595	0.3063	0.0594	0.1014	0.1389	0.3554	0.1266	0.2600	0.1482	0.1963	

SOURCE:

ESTADISTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAÍZ Y FRIJOL. 1958-1972. DIRECCIÓN DE ESTADISTICA Y CENSO.

- The most rapid decline in yields has been in the more remote provinces of Bocas del Toro and Darién and in Colón Province. The average yield decrease in each of these three provinces has been about one-half quintal per year.
 - If the long run trends continue, national average corn yields by 1979-80 will be only 16.3 quintals per hectare, only slightly higher than the very low average yield realized for the 1972-73 crop. Even the leading provinces (Cocle and Chiriquí) will be realizing average yields of less than 22 quintals per hectare.
- * Total plantings of corn in Panama have been declining at the average rate of about 525 hectares per year. The decline is reflected in both first crop and second crop plantings (Tables 6A and 6B).
- Historically, Chiriquí and Veraguas have been the two leading provinces in total plantings of corn, and Los Santos and Panama have been next most important. The long-term trends indicate that Chiriquí is increasing and that Panama is decreasing in relative importance.
 - Plantings of corn are increasing slightly in Chiriquí and Cocle, and in Darién and Bocas del Toro, but are decreasing in all other provinces. The increases in Chiriquí and Cocle are primarily in second crop plantings.
 - The relatively important upward trend in corn plantings in Darién Province (about 350 hectares per year) is evident in the plantings of both the first and the second crops.
 - The most rapid decreases in corn plantings are in Los Santos and Panama Provinces (each more than 300 hectares per year). The declines are reflected in the plantings to both crops in these two provinces.

C. Edible Beans

- * Edible beans have been grown for many years in Panama, particularly by the small non-mechanized farmers. However, total production is minor compared to that of rice and corn, and continues to decline in relative importance as farmers substitute more profitable crops.
- * The production of frijol de bejuco has been reported for a series of years, and illustrates the relative importance and trend in total edible bean production. Total national production of frijol de bejuco

CUADRO 64. SUPERFICIE SEMBRADA DE MAIZ, PRIMERA SIEMBRA
POR AÑO 1960 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 100 HECTAREAS)

EXPONENT IS 1.00

AÑO	PROVINCIA									
	BOCAS DEL			LOS				PANAMA		
	TURBO	CHIRIQUÍ	VERAGUAS	HERRERA	SANTOS	COCLÉ	PANAMA	CULÓN	DARIÉN	TOTAL
1960	4	99	111	42	86	38	72	20	10	482
1961	1	117	111	47	91	40	86	20	14	527
1962	5	98	122	49	95	45	75	24	16	529
1963	5	95	119	46	86	41	75	23	19	509
1964	6	111	137	48	96	47	98	23	24	592
1965	4	116	163	56	106	60	96	22	27	650
1966	3	109	153	63	102	55	102	26	27	640
1967	6	132	172	49	99	61	106	31	24	680
1968	5	106	152	42	114	52	91	20	26	638
1969	5	116	160	45	104	52	83	25	24	614
1970	5	105	81	31	61	40	50	16	41	430
1971	5	73	87	25	68	34	44	9	41	386
1972	5	58	93	31	83	40	48	17	15	390
1973	6	88	113	34	84	47	62	18	35	493
1974	6	86	118	32	83	47	60	17	36	485
1975	6	84	116	31	82	47	57	16	38	477
1976	6	62	115	29	81	47	55	16	39	470
1977	6	80	114	28	80	47	53	15	41	464
1978	6	78	113	26	79	47	50	15	42	456
1979	6	76	111	25	78	47	49	14	44	449
1980	6	74	110	23	77	47	46	14	45	442
YBAR	4.69	102.69	127.77	44.15	91.62	46.54	78.92	21.23	23.69	
S	0.12	-2.03	-1.26	-1.48	-1.02	0.03	-2.38	-0.53	1.54	
MSQ	0.0864	0.1656	0.0258	0.3101	0.0707	0.0002	0.1981	0.1462	0.4075	

SOURCE:

ESTADÍSTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAIZ Y FRIJOL. 1960-1972. DIRECCIÓN DE ESTADÍSTICA Y CENSO.

CUADRO 68. SUPERFICIE SEMBRADA DE MAIZ, SEGUNDA SIEMBRA
POR AÑO 1960 - 1972, CON PROYECCIONES A 1980

(UNIDADES = 100 HECTÁREAS)

EXPONENT IS 1.00

YEAR	PROVINCIA										
	BOCAS DEL		LOS					PANAMA			TOTAL
	TUNO	CHIRIQUÍ	VERAGUAS	HERRERA	SANTOS	COCLE	PANAMA	COLÓN	DARIÉN		
1960	2	64	52	30	67	13	44	9	8	291	
1961	2	99	67	37	80	25	54	11	16	391	
1962	2	63	54	31	77	9	44	6	16	302	
1963	2	111	84	45	86	20	50	14	20	432	
1964	2	103	82	39	78	17	50	9	16	396	
1965	1	97	68	32	90	18	62	14	22	404	
1966	1	118	97	40	79	28	50	11	14	444	
1967	2	132	88	45	71	26	62	10	12	448	
1968	2	109	73	33	72	31	46	17	12	395	
1969	2	99	84	41	57	32	62	17	12	411	
1970	1	53	45	26	57	11	29	7	39	263	
1971	1	85	53	25	51	18	20	5	39	297	
1972	1	85	53	25	51	18	20	5	39	297	
1973	1	95	66	30	52	23	33	9	34	343	
1974	1	95	66	29	57	24	31	9	36	341	
1975	1	95	66	29	47	24	29	9	38	338	
1976	1	95	65	28	44	25	27	9	40	334	
1977	1	95	65	27	42	25	25	9	42	331	
1978	1	95	64	27	39	25	23	8	44	326	
1979	1	96	64	26	37	26	21	8	45	324	
1980	1	96	63	25	34	26	19	8	47	319	
YBAR	1.62	93.69	69.62	34.54	70.23	20.46	46.08	10.38	20.38		
S	-0.08	0.15	-0.46	-0.66	-2.59	0.41	-1.90	-0.16	1.93		
RSQ	0.3500	0.0006	0.0106	0.1312	0.5616	0.0469	0.2517	0.0223	0.4498		

SOURCE:

ESTADÍSTICA PANAMEÑA. INFORMACIÓN AGROPECUARIA, SUPERFICIE SEMBRADA Y PRODUCCIÓN DE ARROZ, MAIZ Y FRIJOL, 1960-1972. DIRECCIÓN DE ESTADÍSTICA Y CENSO.

has dropped from more than 150,000 quintals in 1962-63 to an average of about 120,000 quintals for the five most recent years.

- * The geographic patterns of edible bean production closely parallel those for corn (see Table 4). Beans are grown in all provinces, but most of the production is concentrated in Veraguas and Chiriquí Provinces (about 65 percent of the national total).
- * More than 80 percent of the edible bean plantings are grown as a late winter crop so that they can be harvested in the dry season.
- * The average yields of edible beans have shown a slight upward trend over time, but remain relatively low. Over the past several years the yields of frijol de bejuco have averaged only about 6.5 quintals per hectare, for example.

D. Grain Sorghum

- * Grain sorghum is a very new but very promising crop for Panama. Under the leadership of the former Instituto de Fomento Economico and the University of Panama, the first 60 hectares were grown under actual farm conditions in Chiriquí and Coclé Provinces in 1971-72.
 - The crop has been shown to work in well on the larger mechanized farms, particularly as a winter crop following rice. Farmers are able to take advantage of complementary uses of land, machinery and labor.
 - The crop has proven to be profitable, with yields ranging from 50 to over 100 quintals per hectare. Because per hectare production costs are lower than those for rice or corn, grain sorghum can be much more profitable than corn and may be as profitable as rice for some of the commercial farmers.
 - The demand for grain sorghum as a feed grain by the poultry and livestock industry in Panama is good because of the shortage and high prices of corn. The Government has guaranteed farmers \$4.00 per quintal, and reports are that the private industry is paying them as much as \$4.50 per quintal for grain sorghum.

- * Under these conditions, the plantings of grain sorghum are expanding rapidly. During 1972-73 plantings included in the Government survey jumped to 1655 hectares, and additional plantings may have amounted to as much as 500 hectares. The 1972-73 sorghum production was concentrated in Chiriquí, but included sizeable harvested fields in Coclé, Veraguas and Los Santos.
- * Preliminary indications are that 1973-74 sorghum plantings will be several times greater than those during 1972-73. It appears that grain sorghum is established as an economic crop in Panama, and that future production will do much to reduce the country's projected deficit in feed grains.

E. Added Potential for Grain Production

- * The projections of grain production shown in Tables 1 and 4 represent extensions of present trends rather than potentials. The potentials for increased grain production depend upon available resources and the capacity of agriculture to utilize modern production technology.
- * The estimated total land available for additional plantings of grain is summarized by province in Table 7. The estimates are based upon Panama's semi-detailed soil survey times a factor of 0.75, and upon plantings for the 1969-70 crop year (when weather conditions were favorable for encouraging maximum plantings of grain). Plantings of priority crops (sugar cane, bananas and tobacco) in 1968-69 have been deducted.
 - With the exception of Veraguas, which shows only 1045 hectares of additional land for grain crops, all provinces have substantial additional areas of suitable land which could be brought into grain production.
 - With the exceptions of Herrera and Coclé, the additional available lands are suitable for either rice, or for corn and grain sorghum. In these two provinces, the soil survey indicates that some of the existing rice plantings should be discouraged in favor of other crops.

TABLE 7. ESTIMATED AVAILABLE LAND FOR INCREASED PLANTINGS OF GRAIN IN PANAMA
(hectares)

Item	Bocas del Toro	Chiriquí	Veraguas	Herrera	Los Santos	Coclé	Panamá	Colón	Darién	Country Total
Total Available Rice Land ¹	57,075	88,455	52,345	10,880	17,670	22,260	67,165	20,540	150,690	487,080
Less Permanent Crops ²	<u>7,600</u>	<u>22,640</u>	<u>4,400</u>	<u>3,820</u>	<u>1,320</u>	<u>7,450</u>	<u>610</u>	<u>40</u>	<u>100</u>	<u>47,980</u>
	49,475	65,815	47,945	7,060	16,350	14,810	66,555	20,500	150,590	439,100
Other Available Crop Land ¹	<u>0</u>	<u>0</u>	<u>0</u>	<u>17,305</u>	<u>14,950</u>	<u>30,365</u>	<u>13,125</u>	<u>0</u>	<u>0</u>	<u>75,745</u>
Total Available for Crops	49,475	65,815	47,945	24,365	31,300	45,175	79,680	20,500	150,590	514,845
Plantings 1969-70 (1st crop): ³										
Rice	400	26,100	30,000	9,500	10,200	18,600	9,000	3,600	3,800	111,200
Corn and Beans	<u>500</u>	<u>11,800</u>	<u>16,900</u>	<u>5,000</u>	<u>10,500</u>	<u>5,500</u>	<u>8,400</u>	<u>2,600</u>	<u>2,400</u>	<u>63,600</u>
Total	900	37,900	46,900	14,500	20,700	24,100	17,400	6,200	7,200	174,800
Balance Available:										
Rice	48,575	27,915	1,045	-2,440	6,150	-3,790	57,555	14,300	143,390	292,700
Oil Grains	<u>0</u>	<u>0</u>	<u>0</u>	<u>12,305</u>	<u>4,450</u>	<u>24,865</u>	<u>4,725</u>	<u>0</u>	<u>0</u>	<u>46,345</u>
Total	48,575	27,915	1,045	9,865	10,600	21,075	62,280	14,300	143,390	339,045

¹ Semi-Detailed Soil Survey for Panama with Soil and Climate Suitability Classification by Crop. Total of lands in high and medium classification for the crop times 75 percent.

² Estadística Panamena. Información Agropecuaria, Superficie de Banana, Tabaco y Cana de Azúcar. Año Agrícola 1968 a 1969. Dirección de Estadística y Censo.

³ Estadística Panamena. Información Agropecuaria. Superficie Sembrada y Producción de Arroz, Maíz y Frijol. 1969-70. Dirección de Estadística y Censo.

- For the country as a whole, about 339,000 hectares of land represent potential for expansion of grain production. However, time is required in order to develop access roads to much of area. For example, about 192,000 hectares of the potential are in Darién and Bocas del Toro Provinces, where access roads are now virtually non-existent.
- The figures do indicate adequate areas for continued expansion of both rice and grain sorghum in Chiriquí Province and for continued expansion of corn and grain sorghum in Coclé Province. The agriculture in these two provinces has the capacity to utilize modern technology, and can be expected to make the major contribution to increased grain production in Panama over the next several years.
- The long run potential for greatly expanded grain production in Darién Province is particularly good, but the potential cannot be exploited until roads are constructed into the area. It is not likely that the major impact will be felt until after 1980.

III. PROJECTED DEMAND AND UTILIZATION PATTERNS

A. Projected Volume of Demand

- * The key factors affecting the future volume of demand for food grains in Panama are (1) the projected population and (2) the projected per capita consumption.
 - Per capita consumption is affected by eating habits and food preferences, by average income levels and by the price of grain relative to other prices.
 - Rural people have different eating habits than urban people, so that projected demand by the two segments needs to be developed separately.

- * The demand for feed grains is dependent upon the consumer demand for poultry and livestock products. The nature of the dependence--the coefficients relating the end product demand to the derived demand depends upon (1) the technical conversion rate, (2) the degree to which available alternatives can be substituted for the feed grain in question, and (3) the price of the grain relative to the prices of substitutes and to the price of the end product.

- * For long run projections of the volume of demand, the price effects can be ignored by assuming that Government policy will continue to be one of maintaining the price of grains at existing levels relative to other prices. In this case, the volume of demand becomes a function of the following:
 - The projected population times the base average per capita consumption.
 - The growth in average per capita income times the income elasticity coefficients for the grains in question.
 - The volume of demand for end products for which the grain is used times the corresponding derived demand coefficients.

- * Population projections by province for the rural and urban segments have been made by the Bureau of Statistics and Census on the basis of preliminary results of the 1970 census.

- Total population is projected to increase from 1.43 million in 1970 to 1.93 million in 1980.
 - The urban population will increase from 47.8 percent of the total in 1970 to 53.5 percent of the total by 1980.
 - The concentration of population in Panama City will increase from 32.3 percent in 1970 to 38.0 percent in 1980.
 - The populations in all provinces will increase, but the total population in all other provinces will decrease relative to that in Panamá Province.
- * So long as the income elasticity of demand remains positive, the per capita consumption of food grains will increase as average per capita real income continues to increase. This increase will be greatest in the cities where per capita incomes are rising fastest.
- * The demand for feed grains will increase even more rapidly because the income elasticity of demand for poultry and livestock products is relatively high. The increased demand will be heavily concentrated in Panamá Province because of the concentration of feed manufacturing and industrial processing.
- * By 1980 the volume of demand for rice is projected to increase from 1970 levels by 51 percent, the volume of demand for edible beans by 47 percent and the volume of demand for feed grains by 77 percent.
- * The projected 1980 volumes of demand and the comparative levels in 1970 are as follows (see Table 8):
- Rice, 5.5 million quintals (3.6 million quintals).
 - Corn and grain sorghum, 3.5 million quintals (2.0 million quintals).
 - Edible beans, 238,000 quintals (109,000 quintals).
- * Demand requirements will become increasingly concentrated in the cities of Panamá and Colón. By 1980 the percentage of the country's consumption in these cities and the comparative percentages in 1970 are as follows:
- Rice, 56 percent (50 percent).
 - Corn and grain sorghum, 64 percent (51 percent).
 - Edible beans, 56 percent (46 percent).

TABLE 8. PROJECTED GRAIN DEMAND AND MARKETING BY PROVINCE IN PANAMA FOR 1979-80
(1000 Quintals)

Item	Bocas del Toro	Chiriquí	Veraguas	Herrera	Los Santos	Coclé	Panamá	Colón	Darién	Imports	Total
Rice:											
Total Demand	145.3	341.8	494.7	241.0	208.0	425.3	2584.9	488.0	73.2		5502.2
Production Potential ¹	<u>5.9</u>	<u>2525.9</u>	<u>428.6</u>	<u>127.2</u>	<u>123.9</u>	<u>1176.7</u>	<u>187.3</u>	<u>49.1</u>	<u>78.9</u>	<u>798.7</u>	<u>5502.2</u>
Balance	-139.4	+ 684.1	- 66.1	-113.8	- 84.1	+751.4	-2397.6	-438.9	+ 5.7	+798.7	0
Corn and Grain Sorghum:											
Total Demand	74.2	429.9	252.6	123.1	106.2	217.2	2012.5	244.3	37.4		3502.4
Corn Production Potential ¹	8.2	469.4	304.1	127.2	783.6	153.6	123.4	10.6	135.3		1615.9
Sorghum Production Potential	<u>0</u>	<u>600.0</u>	<u>100.0</u>	<u>50.0</u>	<u>150.0</u>	<u>300.0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>686.5</u>	<u>1886.5</u>
Balance	- 66.0	+ 639.5	+151.5	+ 54.1	+327.4	+236.4	-1888.6	-238.7	+ 97.9	686.5	0
Edible Beans:											
Total Demand	6.3	36.3	21.4	10.4	8.9	18.4	111.6	21.1	3.2		237.6
Production Potential	<u>0.5</u>	<u>20.0</u>	<u>60.1</u>	<u>6.5</u>	<u>7.2</u>	<u>10.4</u>	<u>12.4</u>	<u>3.1</u>	<u>4.3</u>	<u>113.1</u>	<u>237.6</u>
Balance	-5.8	-16.3	+38.7	- 3.9	-1.7	-8.0	-99.2	-18.0	+1.1	+113.1	0
Farm Marketings:											
Rice	3.9	2200.9	100.0	30.0	30.0	526.7	30.0	5.0	38.2		3364.7
Corn and Sorghum	3.7	809.4	229.1	88.2	363.4	346.1	43.2	0	130.0		2013.1
Beans	<u>0.4</u>	<u>10.5</u>	<u>43.6</u>	<u>1.0</u>	<u>1.8</u>	<u>5.4</u>	<u>3.1</u>	<u>1.0</u>	<u>3.3</u>		<u>70.0</u>
Total	8.0	3020.8	372.7	119.2	395.2	1278.2	76.3	6.0	171.5		5447.8
Consumer Marketings:											
Rice	83.1	299.7	96.3	83.4	66.2	101.7	1408.0	257.5	18.9		2414.8
Corn and Sorghum	69.7	169.9	77.6	34.1	36.0	109.7	1931.8	238.7	32.1		2699.6
Beans	<u>6.2</u>	<u>26.8</u>	<u>4.9</u>	<u>4.9</u>	<u>3.5</u>	<u>13.4</u>	<u>102.3</u>	<u>19.0</u>	<u>2.2</u>		<u>183.2</u>
Total	159.0	496.4	178.8	122.4	105.7	224.8	3442.1	515.2	53.2		5297.6

¹Production projections from Tables 1 and 2 x 140% (° x 125% in Darién). Slight upward adjustments in base projects for rice in Los Santos and Panamá Province and for corn in Colón Province.

B. Balances by Province

- * The projected 1979-80 balances of rice, corn and edible beans by province shown in Table 8 are based upon assumed production potentials of 110 percent of the projected trends from Tables 1 and 2, except in Darién Province, where the potential is assumed to be 125 percent of the trend projection.

- * The grain sorghum production potential by 1979-80 is taken at 1 million quintals. Of this amount, 60 percent is assumed to be produced in Chiriquí, 30 percent in Coclé, 15 percent in Los Santos, 10 percent in Veraguas and 5 percent in Herrera.

- * On this basis, the major rice surplus provinces by 1979-80 will be Chiriquí (1,684,100 quintals) and Coclé (751,400 quintals) as shown in Table 8.
 - The major rice deficit provinces will be Panamá (2,397,600 quintals) and Colón (438,900 quintals).
 - Darién Province will have a small surplus, while Bocas del Toro, Veraguas, Herrera and Los Santos will have small deficits.
 - The total production potential for the country indicates a need to import 798,700 quintals of rough rice equivalent in 1979-80.

- * The major deficit provinces for corn and grain sorghum in 1979-80 also will be Panamá and Colón (1,888,600 quintals and 238,700 quintals, respectively). All other provinces except Bocas del Toro will have surpluses, but the leading surplus provinces will be Chiriquí, Los Santos and Coclé. The indicated imports of feed grain needed to balance demand in 1979-80 are 886,500 quintals.

- * All provinces except Veraguas and Darién will be deficit in edible beans by 1979-80, but the major deficits will be in Panamá (99,200 quintals) and Colón (18,000 quintals). Imports of edible beans are projected to reach 113,100 quintals by that year.

C. Projected Marketing Patterns

* The projected marketing patterns by province for 1979-80 shown in Table 8 reflect reduced on-farm consumption as well as the projected supply and demand balances.

- Farm marketings reflect total off-farm sales entering marketing channels. The farm sales of rice are listed in terms of paddy rice.
- Consumer marketings reflect total consumer and industrial purchases in each province. The rice figures are listed in terms of milled rice.

* Farm marketings of rice, corn, sorghum and edible beans will become increasingly concentrated in Chiriquí and Coclé Provinces. By province, the percent of total farm marketings in 1979-80 by province and the comparative percentages in 1969-70 are:

- Chiriquí	55.45 percent (50.65 percent)
- Coclé	23.45 percent (14.40 percent)
- Los Santos	7.25 percent (3.00 percent)
- Veraguas	6.85 percent (15.85 percent)
- Darién	3.15 percent (6.80 percent)
- Herrera	2.20 percent (3.90 percent)
- Panamá	1.40 percent (4.05 percent)
- Bocas del Toro	0.15 percent (0.30 percent)
- Colón	0.10 percent (1.05 percent)

* Consumer and industrial marketings of grains will become increasingly concentrated in Panamá and Colón. By province, the percentage of total consumer marketings by province for 1979-80 and the comparative percentages in 1969-70 are:

- Panamá	60.00 percent (55.10 percent)
- Colón	14.70 percent (13.55 percent)

- Chiriquí	9.40 percent (12.30 percent)
- Coclé	4.25 percent (4.75 percent)
- Veraguas	3.35 percent (4.10 percent)
- Bocas del Toro	3.00 percent (3.35 percent)
- Herrera	2.30 percent (2.80 percent)
- Los Santos	2.00 percent (2.65 percent)
- Darién	1.00 percent (1.40 percent)

- * The increase in off-farm marketings of grain will be relatively greater than the increase in total production or in total demand.
 - Total marketings will increase from 2.6 million quintals in 1969-70 to 5.45 million quintals by 1979-80, an increase of about 110 percent.
 - Total demand will increase from 5.73 million quintals to 9.24 million quintals, or by 61 percent.
 - Total production potentials indicate an increase from 5.58 million quintals to 7.44 million quintals, or by 33.3 percent.

- * The projected increase of 110 percent in the volume of grain to be marketed by 1979-80 indicates the rapid shifting to a market-oriented agriculture. Furthermore, it indicates the critical need for improvements in grain marketing in the years ahead.
 - The needed marketing improvements include modernization and expansion of existing marketing facilities at all levels.
 - Perhaps of greater importance, the needed improvements include development of the essential Government services to support a modern grain marketing system.
 - These needs have been developed in some detail in the basic study. They are summarized in the remaining sections of the Executive Digest.

IV. NEEDED GRAIN MARKETING SERVICES

A. Grain Statistics and Market News

- * Timely and reliable grain statistics and market news represent an essential service for all segments of the grain industry, from the producer to food retailer. The Bureau of Statistics and Census is now reporting some of the key information, but more complete crop and market news will be needed as Panama continues to move from subsistence production to a market-oriented economy. The kinds of information needed include:
- Ch. 8
pp. 169-170
- Plantings, yield, production and disposition by kind of grain, by province and preferably by county.
 - Annual summaries of off-farm marketings and average prices received by farmers by month by province.
 - Supply and utilization balances for each grain by province.
 - Monthly and year-end stocks of grain in inventory by position and location.
 - Volume of receipts and average retail prices for each grain by month for major market locations.
 - Summary of storage, milling and drying capacities and corresponding volumes for the past year by market location.
 - Summary of crop production costs and average net income per hectare and per quintal by crop by province.
 - Periodic summaries of crop conditions, together with estimates of plantings, yields and production by grain by province for the current semester and crop year.
 - Periodic summaries of the volume of receipts, milling volume, shipments and average retail prices for each grain by month at each of the major market locations in the country.
 - Daily market news reports of receipts and current price quotations at major market locations in the country.
- * Attention needs to be given to the methods and systems of dissemination of the crop and market news. Predetermined release times and channels should be worked out and followed religiously. The sooner following collection of the data that the market reports can be released, the more useful the reports will be.

B. Grain Price Support Programs

Ch. 7
pp. 152-160

* The present grain price support programs to Panama's producers are basically sound and should be continued. The suggested changes in price support programs include:

- Introduction of differential price support levels by province to reflect differences in marketing costs to the major consumption centers of Panama and Colón.
- Introduction of seasonal differences in price support levels to reduce harvesting peaks and help defray storage costs.
- Increase in the support price differential between No. 1 and No. 2 rice.
- Introduction of supplemental support price payments to small producers who deliver premium quality rice.
- Introduction of separate classes for flint corn and dent corn, with lower price support levels for dent corn.
- Slight increase in the support price differences for excess moisture and foreign material to reflect cleaning and drying costs.

C. Regulation of Imports and Retail Prices

Ch. 7
pp. 160-161

* It is believed that the regulations of imports and retail price levels have been necessary and reasonably effective in Panama, and it is recommended that these regulations be continued. The recommended changes in price regulation and import policies include:

- Raise the ceiling price of No. 1 milled rice to increase the price differential between No. 1 and No. 2 by 5 cents per pound.
- Introduce geographic price differentials in ceiling prices of up to 3 cents per pound for milled rice, \$1.50 per quintal for corn and grain sorghum and 6 cents per pound for edible beans.
- Introduce seasonal price differentials in ceiling prices of up to 1 cent per pound for milled rice, 4 cents per pound for edible beans and \$1.00 per quintal for corn and grain sorghum.

- Initiate a carefully planned program for increasing imports of feed grains to foster growth of the poultry and livestock industries until feed grain production can be increased.
- On the basis of the recommended expansion of grain statistics and market news, initiate a more carefully managed program of determining the volume and timing of grain imports.

D. Grain Inspection and Grading

- * The present program of inspection and grading by the Government is sound and should be expanded. The recommended expansion of activities includes:

Ch. 8
pp. 176-177

- Establish a national grain laboratory for training in grain inspection and grading and for appeal grading.
- Develop additional education and reference materials, including colored illustrations of reference classifications.
- Conduct grading schools throughout the country for farmers and for millers and other grain buyers.
- Develop a system for inspecting and checking the calibration of scales, moisture meters and other equipment used by industry.
- When these recommended programs have been completed, the Government should consider a national grain grading program requiring that all handlers buy grain from producers on the basis of uniform grades and standards.

E. Marketing Research

- * It is recommended that the Government initiate programs for greatly expanded technical and economic research on grain marketing problems. Eventually much of this type of research will be supported by private industry, but it must be stimulated by Government sponsorship.

Ch. 8
p. 172

F. Expanded Marketing Education and Training

- * It is recommended that the Government initiate programs to prepare manuals and conduct short courses for millers, handlers, truckers and others actually involved in grain marketing.

Ch. 8
pp. 172-174

- Subjects should include such things as grain grading, improved milling techniques, management of bulk storage, mill accounting, grain truck operation and management, materials flows and handling, grain cleaning and grain drying.
- Much of the training can be built around demonstration and experience under operating conditions, and by actually working through case problems.

G. Public Grain Warehousing

Ch. 8
pp. 177-178

* Panama is approaching the time when a public grain warehouse act and an administrative authority to supervise the act will be needed.

- This would permit storage of grain under warehouse receipt in approved bonded warehouses in bulk as well as in bags.
- Owners of grain, whether farmers, handlers, millers, or the Government, could safely place grain in public warehouses with assurance that it will be kept safe and in good condition.
- Millers and handlers who meet the requirements of the act can increase the utilization of storage facilities by becoming licensed public warehousemen.
- The warehouse receipts become negotiable instruments upon which to obtain inventory financing and through which to transfer title to the grain.
- Public grain warehousing can facilitate sound and low-cost inventory financing, reduce speculation, and improve the flow of grain through market channels.

* It is recommended that a small study group be designated to study public warehousing in other countries, seek the counsel of knowledgeable people, and draft proposed public grain warehousing legislation for Panama. It is believed that a public grain warehousing program can be justified by 1975.

H. Leasing of Government-Owned Marketing Facilities

Ch. 6
pp. 110-111

* The present dual system of both Government-owned and privately owned grain marketing facilities makes it difficult to achieve

full utilization of Panama's total facilities for marketing grains.

- In years when market prices remain above support price levels, the Government facilities may be under-utilized while heavy pressure is exerted on the facilities of the private industry.
- By the same token, in years when market prices reach support levels, the utilization of Government facilities may be high while the facilities of the private industry are under-utilized.

* In order to alleviate this problem and insure effective utilization each year of both Government and private marketing facilities, it is recommended that a rental program be initiated.

- It is proposed that the Government lease to private millers and handlers up to 80 percent of idle storage, conditioning and processing capacity in years when deliveries under the price support program are low.
- It is further proposed that the Government lease from private millers and handlers additional storage, conditioning and processing capacity in years when deliveries under the price support program are high.
- It is believed that this two-way leasing program will be more effective than two-way contracting for custom drying, cleaning, handling and storage services. However, the two-way contracting can be effective in increasing the utilization of marketing facilities also, and should be encouraged to the extent that it proves to be more feasible than leasing.

V. NEEDED GRAIN MARKETING FACILITIES

A. Grain Storage Facilities

* Panama's total grain storage capacity in 1970 was 1,876,700 quintals. This includes 321,400 quintals of Government capacity and 1,555,300 quintals of private industry capacity. Of this amount, 85,000 quintals of Government capacity and 130,000 quintals of private industry capacity are silos for storage in bulk. By location in the marketing system, the breakdown of the total storage capacity is as follows:

- Country points, 268,800 quintals
- Terminal points, 1,475,400 quintals
- Distribution warehouses, 132,500 quintals

* In 1969-70 the average annual turnover of the country and terminal capacity was 1.49. The average turnover of the distribution capacity was 10.68. It is believed that under conditions in Panama, the average annual turnover capacity can be raised to 2.0 for the country and terminal capacity and 12.0 for the distribution warehouse capacity.

* On this basis and the projected marketing volumes, the additional grain storage facilities to be needed by 1979-80 include the following:

Ch. 6
pp. 108-121

<u>Type of Facility</u>	<u>Replacement</u>		<u>Additional</u>	
	<u>Number</u>	<u>Capacity(qq)</u>	<u>Number</u>	<u>Capacity (qq)</u>
Country storage (bags)	18	48,200	34	261,000
Country storage (silo)		-	4	90,000
Terminal Storage (bags)	10	284,000	5	64,000
Terminal Storage (silo)		-	10	576,000
Distribution warehouses (bags)		-	11	127,000
	-----	-----	-----	-----
	28	332,200	64	1,118,000

- * Additional storage facilities will be needed in all provinces, but the needs will be concentrated in Chiriquí and Coclé where production is growing rapidly, and in Panamá where demand is growing most rapidly. Some of the needed expansion should be Government-owned facilities, but the greatest improvement and expansion is needed in the private sector of Panamá's grain marketing system.

B. Rice Milling Facilities

Ch. 6
pp. 121-125

- * Panamá now has sufficient rice milling capacity for handling some additional production. Many of the larger mills have been modernized in recent years and are able to achieve very satisfactory performance. Nevertheless, there will be a continuing need for modernization and expansion of Panamá's rice milling industry.

- * The estimated needs for replacement and additional rice milling facilities by 1979-80 for the country as a whole is as follows:

<u>Type</u>	<u>Number</u>	<u>Capacity (Mt./hr)</u>
Replacement	29	25.0
New	18	19.0
	—	—
Combined	47	44.0

- * Some of the additional rice mills will be needed at Government facilities, but most of the new and replacement capacity will be needed by the private industry.

C. Cleaning and Drying Facilities

- * The grain marketing industry in Panamá has adequate cleaning and drying facilities at most key locations in the country. However, the rapidly increasing volume entering marketing channels will require additional conditioning equipment, as well as remodeling and replacement of some of the existing equipment in the years ahead.

- * The estimated requirements for additional cleaners and dryers for rice, corn, grain sorghum and other grains by 1979-80 are as follows:

<u>Type</u>	<u>Number</u>	<u>Capacity (Mt./hr.)</u>
Replacement	47	63.0
New	52	94.7
	—	—
Combined	99	157.7

- * Some of the additional grain cleaners and dryers will be needed at the Government facilities, but the greatest need will be for replacements and expansion by the private industry.

D. Grain Transport Facilities

- * The rapid increase in the volume of grain entering marketing channels plus the increased concentration of production and consumption will put increasing stress in Panama's grain trucking industry. The industry will need to make net additional investment in the order of six new 10-ton long-haul rigs and 13 new 2.5-ton trucks for farm-to-market hauls per year.

- * Including replacements, the estimated numbers of grain trucks needed by 1979-80 are as follows:

<u>Type</u>	<u>Farm-to-Market</u>	<u>Over-the-Road</u>
Replacement	263	81
Additional	131	60
	—	—
Total	394	141

E. Grain Inventories

- * The increasing volumes of grain entering market channels will add substantially to the working capital requirements for financing inventories of rice, corn, grain sorghum and edible beans.

<p>Ch. 6 pp. 190-193</p>

- The average value of grain inventories in marketing channels will reach an estimated \$6.2 million by 1975 and \$8.2 million in 1980.
 - These figures compare with an inventory value of grain in marketing channels during 1969-70 of less than \$4.2 million.
-
- * Inventory carrying costs represent a major portion of the total grain marketing margin between the producer and consumer in Panama. The market value of grain is high relative to the total handling and processing charges (value added) involved. Interest charges are relatively high for short-term borrowings to finance inventories.
 - * Because of these factors, an efficient low-cost system of financing grain inventories in marketing channels would do much to lower over-all marketing costs in Panama.
 - * It is recommended that low cost loan funds be made available to Panama's grain marketing and processing industries for the purpose of financing the added grain inventories in the marketing system.

VI. ESTIMATED COSTS AND BENEFITS OF RECOMMENDED PROGRAMS

A. Estimated Costs for Recommended Marketing Services

- * Cost estimates have been developed for each of the recommended grain marketing services.

Ch. 9
pp. 193-204

- The cost estimates include no provision for additional infrastructure such as office buildings, educational facilities, etc.
 - The estimates are considered minimal to accomplish the desired goals if the funds are used wisely and effectively. No contingency figures have been included.
 - The estimates represent total additional costs for the recommended services. No attempt has been made to identify components of the estimated total costs which might come from alternative sources of funding.
- * As shown in Table 9, the estimated total added cost for the recommended marketing services through 1979-80 is \$8,637,000, or about \$1,240,000 per year.
- Most of the estimated cost for the combined programs is for domestic salaries (\$3,675,000) and operating expenses (\$3,470,000).
 - The estimated capital investment component is \$429,000 primarily for computer-oriented equipment and for grain grading equipment.
 - The technical assistance component is \$493,000, most of which would be incurred during 1973 through 1975.

B. Estimated Costs for Recommended Facilities and Inventories

- * The estimated total added investment for the recommended new and replacement marketing facilities by 1979-80 is as follows on the next page:

Ch. 9
pp. 181-193

TABLE 9. ESTIMATED TOTAL ADDED COSTS FOR RECOMMENDED MARKETING INVESTMENTS, 1975-1980.
(\$1000)

Recommended Program	Capital Investment	Technical Assistance	Domestic Salaries	Materials Field Exp.	Operating Expense	Total
Grain Statistics and Marketing	315	83	880	450	700	2,428
Price Support Programs	-	55	415	-	370	840
Price and Import Control	-	-	160	-	80	240
Grain Inspection and Grading	114	-	320	120	360	914
Market Research	-	160	600	-	440	1,200
Market Education and Training	-	120	800	-	1,080	2,000
Public Grain Warehousing	-	50	260	-	250	560
Facilities Leasing	<u>-</u>	<u>25</u>	<u>240</u>	<u>-</u>	<u>190</u>	<u>455</u>
Combined Programs	429	493	3,675	570	3,470	8,637

- Grain storage facilities	\$1,477,500
- Rice milling facilities	1,114,700
- Cleaning and drying facilities	<u>450,400</u>
Sub-total	\$3,042,600
- Grain transport facilities	<u>2,948,600</u>
Total	\$5,991,200

- * The estimated total working capital requirement to finance average monthly grain inventories in the marketing system for 1979-80 is \$8,242,600, an increase of \$4,055,600 over the requirements in the base period.

Ch. 9
pp. 190-193

- It should be noted that actual monthly inventory financing requirements will fluctuate about the average by as much as 50 percent. Peak requirements will come in October through December following first crop harvests. Minimum requirements will be in July and August prior to the harvest of the new crop.
- The average additional working capital requirement for financing of grain inventories each year of about \$400,000 will fluctuate from \$600,000 in the fall to \$200,000 the following July and August.

C. Estimated Benefits from Recommended Marketing Services

- * The total annual benefits from grain statistics and market news will accrue to producers, to processors and handlers, to consumers and to Government agencies in Panama. These benefits are difficult to measure, but if they amount to only two percent of the farm value of off-farm grain marketings, it would mean an annual saving of \$540,000 by 1979-80.
- * The recommended changes in price support programs will produce an annual income from which to defray storage and transport costs in excess of \$1,500,000 by 1979-80. While much of this income represents transfer payments within the economy, substantial net gains will result from more effective use of resources for grain production and marketing.

- * The recommended changes in price and import control programs will generate annual incomes from which to defray storage transport costs of more than \$1,000,000 by 1979-80. These incomes, too, are largely in the nature of transfer payments, but the recommended changes will improve the allocation of consumer incomes to the net benefit to Panama's economy.

- * The recommended grain inspection and grading programs should benefit Panama far more than the cost for these programs. The benefits will accrue primarily through added farm incomes and increased value added in the marketing system as producers and marketing agencies respond to the more accurate price incentives for quality made possible by grading systems.

- * The recommended marketing research programs should produce a benefit cost ratio of at least 5 to 1, judging from experience in other countries. The benefits will accrue as increased earnings to millers and handlers and as lower grain marketing margins in Panama.

- * The recommended marketing education and training programs will produce benefits similar in kind and magnitude to those of the marketing research programs.

- * The ultimate benefits of public grain warehouses accrue from more orderly marketing, improved seasonal price stability, and lower average marketing costs. The magnitude of these benefits will depend upon the use made of warehouse receipt storage once the system is developed.

- * Leasing of Government-owned marketing facilities could produce an immediate income to the Government (and corresponding benefits to private industry) of as much as \$100,000 per year or more.

D. Estimate Benefits from Recommended Marketing Facilities

- * Analysis of prototype marketing and processing facilities in Panama indicates an attractive rate of return on investment in facilities of the proper type, size and location. The analysis indicates potential annual rates of return on total capital investment of up to 36 percent. When associated net benefits are considered, it is expected that the annual social rate of return on the recommended investment may be as high as 50 percent.

Ch. 10
pp. 205-224

E. Recommended Implementation of Marketing Services

- * The recommended priority in implementation of the marketing services is as follows:
1. Grain statistics and market news.
 2. Expansion of grain inspection and grading.
 3. Development of grain marketing research.
 4. Development of grain marketing education and training.
 5. Leasing program for Government facilities.
 6. Changes in grain price support programs.
 7. Changes in price control and import programs.
 8. Development of public grain warehousing.
- * Each of these programs will need to be developed and implemented by the appropriate agency of the Panamanian Government. It is believed that a direct development loan to the Government would be an effective way to help stimulate early implementation of the needed marketing services.

F. Recommended Development of the Needed Marketing Facilities

- * It appears that the needed additions and improvements in Government-owned grain marketing facilities in Panama are adequately covered by the existing loan commitment and future plans by the Interamerican Development Bank.
- * The expansion and improvements by the private industry to date have been financed largely by equity capital and by loans from private banks in Panama.
 - These sources are important, and should be encouraged as sources of financing for the additional improvements.
 - It is believed that additional financing would stimulate greatly the needed development, however. It is suggested that consideration be given to a development loan which could be used as a source of re-loans to private companies, individuals and cooperatives for the development and improvement of grain marketing facilities.
 - The development loan would need to be administered by an agency such as the Agricultural Development Bank which has the financial and technical competence to supervise the re-loan program.

G. Recommended Implementation of Inventory Financing Program

- * It is believed that the same type of development loan for re-loan to private handlers would be an effective way to provide low-cost financing for working capital needed because of rapidly increasing grain inventories in market channels.
- * This type of re-loan program would make a major and immediate impact by reducing inventory carrying costs and stimulating more effective utilization of grain storage facilities. It be expected to bring an immediate reduction in over-all grain marketing costs to the mutual benefit of grain producers and consumers of grain products in Panama.