Role of Dairy Buffalo in Egypt Food Security

Soliman, Ibrahim

Department of Agricultural Economics, Faculty of Agrculture, Zagazig University, Zagazig, Egypt

2 June 2008

ROLE OF DAIRY BUFFALO IN EGYPT FOOD SECURITY

Dr. Ibrahim Soliman
Professor of Livestock Economics – Faculty of Agriculture, Zagazig University, Egypt
email: ibsoliman@hotmai.com

INTRODUCTION

The milk and dairy imported products of Egypt had jumped from around 195 million dollars in 1990 to more than 422 millions in 2005, (Table 1). The bulk of imports value has recently become as powder milk (65% of 2005 imports value). This is because the price of the reconstituted skim

powder milk has being for a long time much cheaper than the domestic produced raw milk. Although milk production volume has almost doubled over the period (1990-

2005), as shown in Table 2 the self- sufficiency in milk has stayed around 80%. On the other hand, red meat imports have risen significantly over the last two decades (Table 3). Its value was 270 million dollars in 1990 and raised to 309 in 2005, the bulk was imported as either carcass, or boneless meat, (Table 4). Although red meat production increased from about 410 thousand tons in 1990 to more than 692 thousand tons in 2005 at annual growth rate 3,3% (Table 5), self sufficiency of Egypt in red meat has not increased significantly, i.e. from around 77% to 81% along the same period. (1990-2005). Although animal protein is a vital nutrient in daily diet, particularly for vulnerable groups (pre-school Childs, pregnant and lactating women), it has not reached the recommended percentage in Egyptian daily diet, i.e. one third of gross protein intake (Soliman & Eid, 1995). The average per capita annual consumption of milk and meat reached almost one third of the world average. The average per capita consumption of milk increased from 45Kilograms in 1990 to almost 55kilograms in2005, at annual growth rate 1.3% (Table2). At the same growth rate the average per capita consumption of red meat increased from 9.5kilograms to 11.7 kilograms during the same period, (Table5).

From estimated demand and supply model for red meat and milk markets in Egypt a recent study (Ibrahim Soliman, 2007a) has shown that the milk price at the end of this

5 years plan would reach 3 folds its current

price. While the milk price would increase from $0.55 per kilogram to $1.34 kilogram in 2012, the red meat price would increase from $6.5 to $9.3 during the same period. Therefore, this study investigate the potential economic role of Egyptian buffalo in raising per capita consumption of meat and milk based upon domestic production and monitoring the price inflation of both commodities in the Egyptian market.

BUFFALO ROLE IN MILK AND MEAT PRODUCTION

Buffalo Stock in Egypt increased from 2898 thousand heads in 1990 to about 3920 thousand heads in 2005 at an annual growth rate of 2.2%. Producible units of such population are the milking heads. Their numbers increased from 1330 thousand heads in 1990 to about 1640 thousand heads in 2005 at an annual growth rate of 2.2% (CAPMAS, 2007). Such buffaloes population shared by about 54.5% of milk production which was about 2292 thousand tons in 1990. This share increased to 56% of 4103 thousand tons in2005. The annual increase rate in buffalo milk production was about 3.8%, (Table 6), which was the highest rate among other types of livestock producing milk in Egypt. The major share of buffalo milk in total milk production of Egypt is actually much higher than apparent one. This is because of two reasons. First, most, if not all, milk production of sheep and goats are devoted to rearing suckling lambs and kids, (James Fitch, Ibrahim Soliman, 1983) Secondly, readjustment of buffalo yield as milk Equivalent of 4% fat, to be comparable to cow milk, would raise buffalo milk volume by almost 70%, by using "Jane's Equation", (Ibrahim Soliman and Ahmed Mashhour, 2002).

With respect to meat, buffalo share in total production has stayed around 39% along the last two decades, (Table 7), even though its production volume increased from 161 thousand tons in 1990 to more than 270 thousand tons in 2005, at annual growth rate of 3.2%. Cattle meat production has the highest share in the recent years, (Table 7).

FOOD SECURITY OF EGYPT AND ECONOMIC CONCEPTS

The Egyptian Economy, particularly agricultural sector, has passed dramatic changes towards free market economy over the last two decades. Such reform policies include liberalization of input and output prices as well as foreign exchange rates of local currency and interest rate, besides privatization of almost all production sectors, (Ibrahim Soliman, 1991). Such changes implies reallocation of limited agricultural recourses on base of the best economic alternative use. Egyptian agriculture is almost fully surface irrigated by limited quota of river Nile water and little sub- ground water. The rained agricultural land is rare. There are high competition among human food and industrial crops with fodders and feeds on such limited land and water resources. Therefore, feeds and fodders domestically produced are relatively expensive in comparison with extensive rained agricultural systems in many other countries (Ibrahim Soliman, 2007b) Accordingly, Egypt should concentrate on only one or two types of animals that would have the most economic performance with respect to milk and meat production within the Nile valley agricultural acreage. The two candidate animals are Buffaloes and Cattle.

EGYPT COMPARATIVE ADVANTAGE IN MILK AND MEAT PRODUCTION

Comparative advantage is the economic principal for allocation of resources as the free market economy system is applied. It means to allocate resources for a set of products among all possible ones, where the resources perform the least disadvantages in terms of costs of production, (Ibrahim Soliman, 1994).

Among several indicators to estimate the comparative advantage is the "Nominal protection Coefficient (NPC)". Such coefficient is estimated from the following equation:

$(NPC) ij = Pij0/P_{ija}$

Where:

$(NPC)_{ij}$ = The nominal protection coefficient of the commodity (i) produced by resource j $Pij0$ = Farm Price of the commodity (i) produced by resource j in the domestic (0)

P_{ija} = Farm Price of the commodity (i) produced by resource j in the alterative market (a)

Where in our model:

i = m for milk and r for red meat,

j = (b) for buffalo and (c) for cattle

The farm price is used as the closest one to the costs of production value. The data were extracted from (FSTAT), the statistical data base of FAO over the period 1990-2005. The domestic market is the Egyptian market and the alternative one that supposes to perform competitive conditions is the average world market. It is assumed that the aggregate average of the world market reflects the fair free competitive market conditions. Accordingly the judgment for the Egyptian market is concluded from the result of the following criteria:

If (NPC) ij <1 ~ Egypt has a comparative advantage in producing Commodity i by livestock type j, otherwise it has not such advantage.

If cattle and buffaloes under Egyptian market conditions have shown comparative advantage performance in producing both commodities (milk and meat), another indicator should be used to judge which type of livestock should have the first priority in food security plan. Such indicator is presented by the following equation:

If (NPC) bj / (NPC) cj <1 ~ buffalo production of commodity j (milk or meat) is more economical in utilizing resources under Egyptian market conditions.

Investigation of the results of calculating the nominal protection coefficient for milk and meat production in Egypt by buffalo and cattle, (Table 8 and Table 9) showed that Egypt has apparent comparative advantage in milk production from both types of livestock, because the estimated (NPC) was less than one in all concerned years. However, the estimated (NPC) for milk and meat produced by buffalo was less than that estimated for cattle in all investigated years (1990-2005). The estimated coefficient for buffaloes was not only less than that for cattle but it also decreased gradually over time at speeder rate than cattle. This result gives buffaloes more economic advantage in Egypt than cattle, along with further involvement of the Egyptian economy in free market system.

In lights of what shown above about the implication of comparative advantage, and results of (Table 8 and Table 9), It showed that the nominal protection coefficient for milk production by buffalo was less than the estimated one for meat, particularly from the year 1994 until 2005.

PRIORITY IS FOR MILK IN BUFFALO DEVELOPMENT PLAN

The results showed that the average farm gate price of both milk and meat from buffalo was less than the average international market, but it was much lesser for milk than meat. Therefore, the development plan should focus upon raising buffalo milk productivity, particularly that milk price projection, as shown in the introduction, would reach 2.5 folds its current level due to speed demand increase and slow production growth.

Among the major targets towards raising milk productivity from the Egyptian buffaloes herd are the annual milk yield per milking head and the herd structure, particularly the proportion of milking herd in the stock. Although milk yield per milking buffalo has raised from 940 kilograms in 1990 to about 1402 in 2006, and at a higher annual growth rate of 2.5%, than the world average (2%), it was less than the comparable milk yield level of the world average. The world aggregate average reached only 1537 kilograms per milking buffalo in 2006, i.e. higher than the same year average of Egypt by 8.8%, (Table10), (Figure 1). Although the proportion of the milking buffaloes in the total herd of Egypt was significantly higher than the world average (Table 11) along the last two decades (Figure 2), it has shown a rate of decrease by about -0.6% a year. In addition, the optimum milking heads proportion in total herd structure should be 50%, (Mohammed Sharaf, Ibrahim Soliman & Ahmed Seleem, 1987). Accordingly as the percentage of milking buffaloes in the Egyptian stock reached 42% in the year 2006,

such percentage should be raised by 19% above its current level to approach 50%. Therefore, if the development plan oriented the credit policies, veterinary care programs and feeding plan of buffaloes towards reaching the target improvement of buffalo milk productivity, the total milk production of Egypt would be raised by about 29%, as calculated from the following equation.

$$r_{mp} = r_{mb} + r_{my}$$

Where:

r_{mp} = growth rate in national milk production

r_{mb} = growth in milking buffaloes number

r_{my} = growth in milk yield

Such increase would raise milk production self-sufficiency of Egypt and shrink the speed of its price increase. There would be not only positive economic impacts but there would also be social impacts on nutritionally vulnerable groups by raising per capita consumption.

CAUDAL CONCLUSION

It should be mentioned that the study assumed in its analysis the aggregate average of the world market reflects the fair free competitive market conditions. However such assumptions are not fully true, either about free market conditions or the significance of the world average farm price. These because there are several markets may practice undetectable governmental interventions in the price mechanism. Also, there are several countries are not highly producible to be potentially effective in the international markets as those of high share in world production and world export market of either milk or meat, such as western Europe, America and Australia. Therefore, further study is going to repeat the estimates with limiting the comparison on base of the a few markets that have high significant share in world production and exports of both investigated commodities

Buffalo Newsletter - Number 23 - June 2008

1 Egypt Milk Imports Value $(000) over the period (1990-2005)

Year	Value	Powder Milk	Full cream milk	Cheese	Yoghourt	Casein	Total	Milk fat products	Grand total
1990	(000) $	37,615	276	43,903	1	445	82,242	112,300	194,542
	%	45.74%	0.34%	53.38%	0.00%	0.54%	100.00%	57.73%	100%
2005	(000) $	104,384	306	51,861	22	4,482	161,055	260,708	421,763
	%	64.81%	0.19%	32.20%	0.01%	2.78%	100.0%	61.81%	100%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 2 Self Sufficiency in Milk of Egypt over the Period (1990-2005)

year	Value	Production	Imports	Available	Export	Other Uses(1)	Net Consumption	Kg/ Capita/ Year
1990	(000) tons	2292	721	3012	27	501	2485	45.07
	%	76.10%	23.90%	100.00%	0.90%	16.60%	82.50%	
2005	(000) tons	4103	956	5059	159	883	4017	55.14
	%	81.10%	18.90%	100.00%	3.10%	17.50%	79.40%	
Annual Growth rate (%)		3.6%	1.8%	3.2%	11.1%	3.5%	3.0%	1.3%

(1) It is the sum of wastes and milk used for suckling.

Table 3 the Self Sufficiency in Red Meat of Egypt over the Period (1990-2005)

Year	Value	Total Red Meat Production	Imports	Total Supply	Total Exports	Net Consumption
1990	Tons	410,045	122,014	532,059	6,854	525,206
	%	77.1%	22.9%	100.0%	1.3%	98.7%
2005	Tons	692,505	158,980	851,485	2,619	848,865
	%	81.3%	18.7%	100.0%	0.3%	99.7%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org

Table 4 Egypt Red Meat Imports Value $(000) over the period (1990-2005)

year	Value	Carcass, Boneless, Processed meat	live animals	Total Imported red meat
1990	$ (000)	263,298	7,203	270,501
	%	97.3%	2.7%	100.0%
2005	$ (000)	300,149	8,977	309,126
	%	97.1%	2.9%	100.0%
Growth Rate/ year	%	0.8%	1.4%	0.8%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 5 the Self Sufficiency in Red Meat of Egypt over the Period (1990-2005)

Year	Value	Total Red Meat Production	Imports	Total Supply	Total Exports	Net Consumption	Per Capita (Kg)
1990	Tons	410,045	122,014	532,059	6,854	525,206	9.5
	%	77.10%	22.90%	100.00%	1.30%	98.70%	
2005	Tons	692,505	158,980	851,485	2,619	848,865	11.7
	%	81.30%	18.70%	100.00%	0.30%	99.70%	
Annual growth	%	3.3%	1.7%	2.9%	-6.0%	3.0%	1.3%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 6 Milk production in Egypt i (000) Tons

Year	Value	Red Meat Production	Imports	Total Supply	Total Exports	Net Consumption	(Kg)/Capita year
1990	Tons	410,045	122,014	532,059	6,854	525,206	9.5
	%	77.10%	22.90%	100.00%	1.30%	98.70%	
2005	Tons	692,505	158,980	851,485	2,619	848,865	11.7
	%	81.30%	18.70%	100.00%	0.30%	99.70%	
Growth Rate/year	%	3.30%	1.70%	2.90%	-6.00%	3.00%	1.30%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 7 Red Meat production in Egypt i (000) Tons

Year	Value	Buffalo	Camel	Cattle	Sheep	Goat at	Total Red Meat
1990	(000) tons	161	22	143	55	28	408
	%	39.3%	5.4%	34.9%	13.3%	6.7%	100.0%
2005	(000) tons	270	40	320	43	18	691
	%	39.0%	5.8%	46.2%	6.1%	2.6%	100.0%
Annual Growth rate (%)		3.2%	3.7%	5.0%	-1.6%	-2.6%	3.3%

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 8 Indicators of Egypt Comparative Advantage in Milk Production

Year	Buffalo Milk			Cow Milk			Buffalo/ Cow
	Farm Price ($/ton)		Nominal	Farm Price ($/ton)		Nominal	
	Egypt	World	Protection	Egypt	World	Protection	
1991	337.79	368.65	0.92	334.61	383.71	0.87	1.05
1992	334.16	414.33	0.81	312.79	378.93	0.83	0.98
1993	344.52	874.56	0.39	313.50	445.57	0.70	0.56
1994	355.08	461.75	0.77	314.02	354.34	0.89	0.87
1995	383.23	550.07	0.70	316.61	395.83	0.80	0.87
1996	398.06	590.61	0.67	309.30	406.11	0.76	0.88
1997	398.38	643.77	0.62	309.55	411.39	0.75	0.82
1998	442.74	728.69	0.61	344.16	399.99	0.86	0.71
1999	441.79	813.82	0.54	343.42	395.29	0.87	0.62
2000	432.02	800.37	0.54	335.83	381.23	0.88	0.61
2001	402.72	805.36	0.50	312.86	377.99	0.83	0.60
2002	368.92	824.70	0.45	286.69	391.40	0.73	0.61
2003	316.19	1077.44	0.29	259.79	445.65	0.58	0.50
2004	326.59	1146.88	0.28	270.94	490.43	0.55	0.52
2005	363.56	1239.52	0.29	304.29	515.58	0.59	0.50

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 9 Indicators of Egypt Comparative Advantage in Meat Production

year	Buffalo Meat			Cow Meat			Buffalo/ Cow
	Farm Price ($/ton)		NPC	Farm Price ($/ton)		NPC	
	Egypt	World average		Egypt	World Average		
1991	2263.86	2631.73	0.86	2333.33	3032.97	0.77	1.12
1992	2197.64	3012.92	0.73	2257.85	2908.69	0.78	0.94
1993	2647.86	3205.30	0.83	2350.17	2887.81	0.81	1.02
1994	2782.76	3185.91	0.87	2383.95	2569.11	0.93	0.94
1995	2928.77	3580.93	0.82	2626.61	2869.79	0.92	0.89
1996	3087.15	3718.61	0.83	2703.83	2854.89	0.95	0.88
1997	3083.73	3452.89	0.89	2773.88	2720.41	1.02	0.88
1998	3019.48	3462.25	0.87	2780.40	2684.90	1.04	0.84
1999	3163.24	3990.13	0.79	2736.18	2729.14	1.00	0.79
2000	3335.21	3913.60	0.85	2911.82	2614.83	1.11	0.77
2001	2937.33	3848.48	0.76	2975.08	2643.33	1.13	0.68
2002	3381.36	3811.63	0.89	3015.78	2786.91	1.08	0.82
2003	2998.70	4737.41	0.63	2678.23	3137.42	0.85	0.74
2004	3213.48	5093.18	0.63	2873.11	3473.73	0.83	0.76
2005	3733.39	5449.09	0.69	3258.37	3736.11	0.87	0.79

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 10 Trend of Buffalo Milk Productivity: Egypt versus World Average

| Year	Kilogram of milk Per Milking Head		
	Egypt Average	World Average	Egypt/ World
1990	940	1115	0.843
1991	957	1116	0.857
1992	970	1150	0.8437
1993	1032	1187	0.8699
1994	1039	1213	0.8564
1995	997	1285	0.7758
1996	1203	1316	0.9138
1997	1340	1346	0.9954
1998	1340	1351	0.9921
1999	1340	1406	0.9532
2000	1340	1426	0.9396
2001	1349	1438	0.9381
2002	1273	1447	0.8798
2003	1603	1489	1.0767
2004	1400	1497	0.935
2005	1402	1506	0.9311
2006	1402	1537	0.9127
Annual Growth rate (%)	2.5%	2.0%	

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)

Table 11 % of Buffalo Milking Heads in Total Stock: Egypt versus World Average

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Growth Rate/ Year
Egypt	46	46	46	46	47	45	46	46	48	45	45	46	46	42	42	42	42	-0.60
World	27	26	26	26	27	27	27	28	29	28	28	29	29	29	29	30	30	0.70
Egypt / World	1.72	1.75	1.77	1.76	1.76	1.69	1.7	1.63	1.67	1.6	1.58	1.6	1.59	1.46	1.43	1.39	1.41	

Source: Calculated from: Statistical Data Base of Internet Site (www.fao.org)
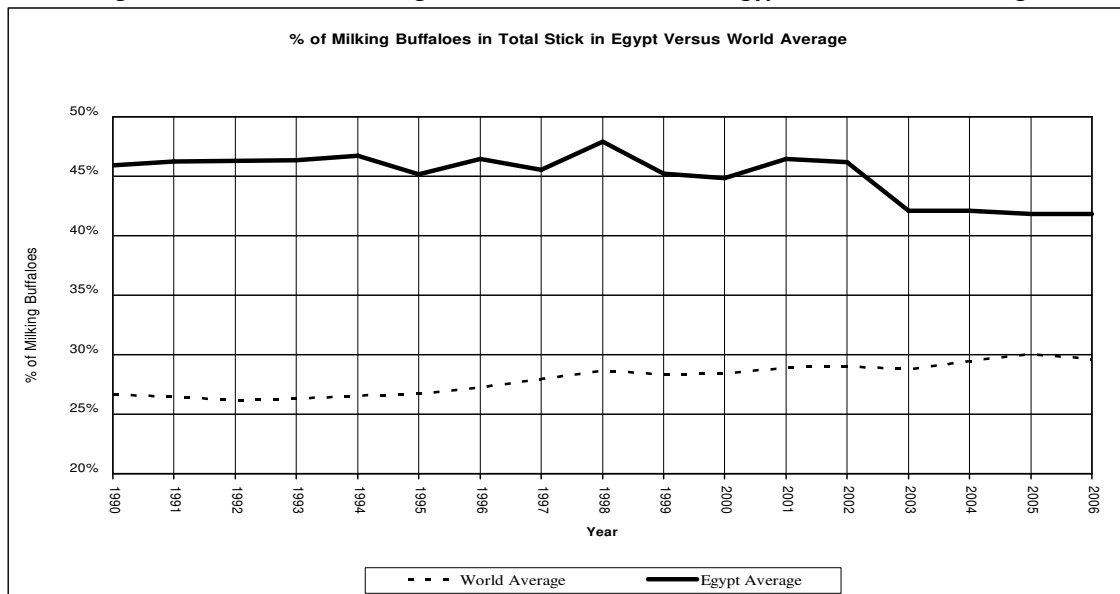
Figure 1 Trend of Buffalo Milk Productivity in Egypt versus World Average
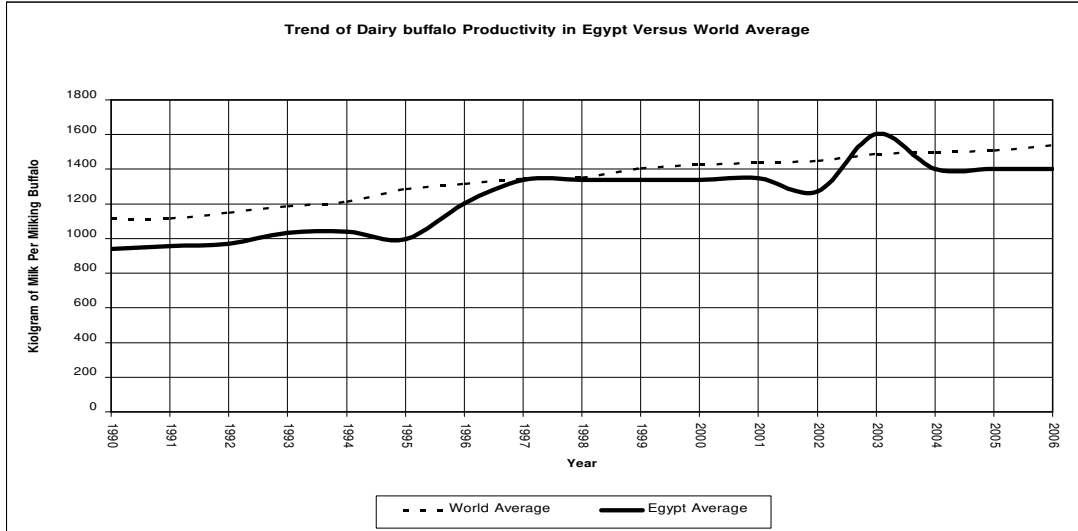
Source: **Table 10**

Table 10

Figure 2 Trend of % of Milking Heads in herd Structure in Egypt Versus World Average

% of Milking Buffaloes in Total Stick in Egypt Versus World Average

Source:

Table **11**

REFERENCES

(CAPMAS) Central Agency Of Public Mobilization And Statistics Of Egypt, "Animal Wealth Statistics", several numbers

IBRAHIM SOLIMAN (1991). "Feasibility of Buffalo Production in Egyptian Economy through A Planning Model" Proceedings of the 3rd World Buffalo Congress Vol.2 "Statistics" P.293-300 Organized by the International Buffalo Federation, in Collaboration with the Agricultural Academy in Sofia, Held at Vama, Bulgaria.

IBRAHIM SOLIMAN (1994) "Impacts of GATT Implication on Animal Protein Food System in Egypt" Egyptian Journal of Agricultural Economics, Vol.4, No.2, P. 172-192, the Egyptian Association of Agricultural Economics, Agriculturalists Club, Dokki, Giza, Egypt.

IBRAHIM SOLIMAN (2007) "Economic Allocation of Agricultural Resources and Arab Countries Integration", Journal of The Council of Arab Economic Unity (CAEU), Volume 25, No. 1, June

IBRAHIM SOLIMAN (2007a) «Speed increase in Animal Products Prices is an inherited phenomenon in Egyptian Economy rather than occasional events), Proceedings of the 17th Annual Conference of Agricultural Economists "on Animal Wealth Development in Egypt", organized by the Egyptian association of Agricultural Economics, Held in Agriculturalists Club, in Dokki, Giza, Egypt (17th-18th of October, 2007).

IBRAHIM SOLIMAN (2007b) "Economic Allocation of Agricultural Resources and Arab Countries Integration", Journal of The Council of Arab Economic Unity (CAEU), Volume 25, No. 1, June.

IBRAHIM SOLIMAN & NAFISSA EID (1995) "Animal Protein Food Consumption Pattern and Consumer Behavior" Economic Research Forum (ERF), Working Paper No. 9516.

IBRAHIM SOLIMAN AND AHMED MASHHOUR (2002), "Socio-Economic Aspects of Buffalo production", Proceedings of the 4th Asian Buffalo Congress on "Buffalo for Food Security and Rural Employment", Volume One: LEAD PAPERS, P. 272 - 283, Organized by Indian Association for Buffalo Development & Asian Buffalo Association, Financed by American Soya Association, Held in New Delhi, India.

JAMES FITCH, IBRAHIM SOLIMAN (1983) "Livestock and small farmer Labor supply" in "Migration, mechanization, and Agricultural Labor Markets in Egypt", PP. 45 -77, Edited by Alan Richards and Philip Martin, West-view Press, Boulder, Colorado, U.S.A.

MOHAMMED SHARAF, IBRAHIM SOLIMAN & AHMEDS SELEEM (1987)."Towards Development of Marketing Systems of Livestock, Animal Products & Fish in Egypt" Published in "National Symposium of Price & Marketing Policies in Egypt" (Editors Fahmy Bishay, S. Nasser & Z. Abdullah), FAO, TCP, EGY 665, Vol. 3, No. (1).