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Assessing the Comparative Advantage of Sheep Industry in Al-Hasakah District, Syria: A Policy Analysis Matrix Approach

Alaa Hammo*, Ali Abdul-Aziz and Shabab Nasser

Agricultural Economics Department, Faculty of Agriculture, Damascus University, Damascus 97089, Syria

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Abstract: This study aimed to assess the comparative advantage of Sheep industry in Al-Hasakah district, Syria. The primary data for an average 2017/2018 and 2018/2019 were collected using a questionnaire designed for this purpose, distributed to the sample size of 313 rearers, they were selected using simple random sampling method, from the administrative areas of Al-Hasakah district. The results showed the nominal protection coefficient on tradable outputs (NPCO) equal to 0.77 that indicated the policies have caused the domestic output price to be less than the social price by 0.23. While the nominal protection coefficient on tradable inputs (NPCI) equal to 1.05, that showed the domestic input cost is greater than the input cost at social prices and the system is taxed by policy. The effective protection coefficient (EPC) equal to 0.62 that indicates the net effect of policies that alter prices in product markets is to reduce private profits by 0.38, and the combined transfer effect is thus negative, and the domestic resource cost (DRC) value of 0.11, which indicated that the study area has a comparative advantage in Sheep industry.

Key words: Domestic resource cost, agriculture policies, revenues, costs, tradable and non-tradable, private and social prices.

Sheep were among the first domesticated animals and their role in ancestral agro-ecosystem was critical for the development and advancement of human civilization (Baba *et al*., 2015). Marketing of sheep and their products has long been an important component of the generation of rural income, and sheep has been one of Syria's most profitable export commodities. The bulk of Syria's livestock population consists of sheep raised for meat, milk and wool from mostly indigenous rears of multipurpose animals (Baghasa, 2006).

The Awassi sheep rear enjoys a premium in the Arabian Gulf live sheep markets over other sheep breeds sourced from Australia, New Zealand and South Africa (Cummins, 2000). In Syria, the total number of Awassi sheep in 2018 was estimated at 14.05 million heads (MAAR, 2018).

As a consequence of the current circumstances Syria passed through, it was necessary to measure the impact of state intervention on agricultural pricing policies introduced, such as the free distribution of medicines and sheep vaccinations, the provision of supplementary feed rations to sheep herds on a subsidized and deferred payment basis, the promotion of private-sector imports of feed, in particular barley.

This study highlights the importance of sheep's economic and marketing effectiveness and profitability in providing a national trade balance in the foreign currency, and the increased demand for it from The Arabian Gulf states' markets, and evaluate the importance of the policy analysis matrix and whether by the assessment of the effects of agriculture policies in Al-Hasakah district's livestock production market, local production can expand and be supported or left based on the profitability of local production and its world competitiveness. To determine among the best local distribution of resources within the trade conditions of free competition, specialization and reliance on comparative advantage in the light of the path of agricultural and economic policies for production planning and export operations in the livestock sector and to achieve efficient use of available resources. Consequently, the objective of the present study is to assess the comparative advantage of sheep production in the Al-Hasakah district, Syria.

Materials and Methods

Total 313 rearers were selected using simple random sampling method from 36 villages

*E-mail: alaasuliman@outlook.com

Table 1. Framework of policy analysis matrix (PAM)

Items	Revenue	Costs		Profit
		Foreign (tradable)	Domestic (non-tradable)	
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergences	I	J	K	L

Source: Monke and Pearson, 1989.
Note: A = Revenue in private price; B = Inputs tradable in private price; C = Inputs non-tradable in private price; D = Private profitability; E = Revenue in social price; F = Inputs tradable in social price; G = Inputs non-tradable in social price; H = Social profitability; I = Output transfer; J = Input transfer; K = Factor transfer; L = Net transfer.

distributed across Al-Hasakah district. For assessing the objectives of the study, primary data relating to an average agricultural year 2017-2018 and 2018-2019 were collected from the sampled farmers according to a pre-tested questionnaire through personal interview.

The Policy Analysis Matrix

Monke and Pearson (1989) developed the Policy Analysis Matrix (PAM), which was utilized to analyze comparative advantage and economic efficiency of sheep industry, using two enterprise budgets, one valued at market prices and the other valued at social prices (Table 1). PAM framework is particularly useful in identifying appropriate direction of change in policy and is commonly used (e.g. Sembiring, 2017; Elbadawi *et al.,* 2012; Emam and Salih, 2011; Babiker *et al*., 2010; Osman *et al.,* 2006; Morrison and Balcombe, 2002; Zainalabidin *et al.,* 1995).

PAM as presented in Table 1, has three rows, the first row of the PAM is the calculation of private profitability (D), defined as revenue (A) minus total costs (B+C), where, B and C are tradable and domestic inputs, respectively (Table 1). In other words, the first row of the PAM contains the value for the accounting identity measured at private prices (market prices), which are the price actually used by local rearers to purchase their inputs and sell their outputs. Private profitability in the first row, demonstrates the competitiveness of the sheep industry system, given current prices for inputs, outputs and policy (Elbadawi *et al*., 2012). The second row of the PAM calculation based on social prices (economic prices), describe the price or social value or the economic value for the elements of cost and performance. In other words, that reflects social opportunity costs. Social profitability (H) measures revenue valued at social prices minus value of tradable and domestic input both valued at social prices. In other words, measure efficiency and comparative advantage. A positive social profit indicates that the system uses scarce resources efficiently and contributes to national income (Nelson and Pangabean, 1991). The negative social profits indicate social inefficiencies suggesting that production at social cost exceed the cost of import. In other words, the sector cannot survive without Government support when social profits are negative. The third row involves the calculation of the price difference in private cost and the social cost as a result of the impact of Government policies or existing market distortions. In other words, represents the extent to which policies distort revenues and cost from international levels (Emam and Salih, 2011).

According to Yao (1997), the PAM framework can also be used to calculate important indicators for policy analysis. These include NPCO, NPCI, EPC and DRC.

1. The nominal protection coefficient on tradable outputs (NPCO) measures the impact of commodity specific price interventions such as import tariffs. NPCO is given by the ratio of private revenue to social revenue (A/E). An NPCO greater than (1) implies that the domestic output is protected and vice versa, if the ratio is less than (1).

2. The nominal protection coefficient on tradable inputs (NPCI) is expressed as (B/F) the ratio of value of tradable inputs at local market prices or private prices to value tradable inputs at world market prices or social prices.

3. The effective protection coefficient (EPC) will measure the total effect of Government interventions; it can be computed from the PAM as a ratio of value added in local market prices (A-B) to the value added in the world prices (E-F). If EPC is greater than (1), it means

that Government intervention has favored local production, although it is more economical to import the commodity (Legese *et al*., 2007).

4. The domestic resource cost (DRC) is the ratio of the domestic production in social values (G) to value added again in social terms (E-F). It indicates the cost of domestic factors that has to be incurred to obtain (1) unit of value added in social terms. A DRC value between zero and less than (1) implies that commodity has a comparative advantage while the value above (1) and those negative indicates that an activity is wasting scarce resources that could be used efficiently elsewhere (Mahlanza *et al*., 2003).

The compilation of revenue and production cost, trading and processing cost profiles collected from the farms were in the private value. These private values need to be converted into social value prior to DRC calculations. Conversion Factors (CF) were used to convert the private to social values. The CF of a selected item that had a direct involvement in the production of sheep is presented in Table 2. For the selected items that have no CF, the CF need to be estimated and was categorized into immediate inputs and primary inputs. The immediate inputs included the following: Feed (barley and hay), medicine, vaccine, and supplement, fuel, water and electricity. The primary inputs included labor, depreciation and interest.

In addition, for allocating the cost of inputs into the domestic and foreign components it is important to calculate the DRC. All input or output that is not being traded across National boundaries of a particular country either because of the cost of production or limited trade practices is named as domestic component. Cost of domestic component is also known as non-tradable cost. On the other hand, all input or output is traded if its production and consumption will affect the country's level of import or export on the margin, named as the foreign component. Cost of foreign component is also known as tradable cost. The breakdown of domestic and foreign components is presented in Table 3.

Table 2. Conversion factors from private to social analysis

Items	Conversion factor
Feed (barley and hay)	0.95
Medicine, vaccine and supplement	0.88
Water	0.75
Electricity	0.84
Fuel	0.88
Depreciation building	0.86
Depreciation sheep	0.90
Interest	1.30
Losses	1.00

Source: Veitch, 1986.

Table 3. Allocation of costs between domestic (non-tradable) and foreign (tradable) components

Items	Domestic (non-tradable cost)	Foreign (tradable cost)
Barley	0.2	0.8
Hay	0.45	0.55
Supplement	0.2	0.8
Veterinary services	0.5	0.5
Electricity	0.08	0.92
Fuel	0.25	0.75
Water	0.6	0.4
Labor	1	0
Depreciation building	1	0
Depreciation sheep	1	0
Interest	1	0
Losses	1	0

Source: Veitch, 1986 and Lanson, 2005.

Results and Discussion

The study results estimated that the domestic (non-tradable) components at private prices was 31155.54 SP. head^{-1}, while the foreign (tradable) components at social prices was 29765.08 SP. head^{-1} and the domestic (non-tradable) components at private prices was 6756.79 SP. head^{-1} and the a foreign (tradable) components at social prices was 6258.27 SP. head^{-1}, as it is shown in Table 4.

The results of the study revealed that the revenues at private prices amounted to 65297.15 SP. head^{-1}, while the revenue at social prices was 84941.301 SP. head^{-1}.

PAM indicators

Table 5 presents the composite PAM constructed for the competitiveness assessment of the sheep industry in Al-Hasakah district,

Table 4. Production costs at private and social prices in Al-Hasakah district, Syria (Unit: SP. head^{-1})

Items	Private prices		Social prices	
	Tradable	Non-tradable	Tradable	Non-tradable
Depreciation building	557.50	0	479.45	0
Depreciation sheep	6835.60	0	6152.04	0
Losses	1098.85	0	1098.85	0
Interest	2441.04	0	3173.35	0
Barley	8560.00	2140.00	8132.00	2033.00
Hay	3671.25	3003.75	3487.69	2853.56
Electricity	276.00	24.00	231.84	20.16
Water	240.00	360.00	180.00	270.00
Fuel	242.25	80.75	213.18	71.06
Veterinary services	1148.29	1148.29	1010.49	1010.49
Labor	4800.00	0	3936.00	0
Incidental costs	1284.76	0	1670.19	0
SUM	31155.54	6756.79	29765.08	6258.27

Source: Field survey.

Table 5. Revenue at private and social prices in Al-Hasakah district, Syria (Unit: SP. head^{-1})

Items	Private prices	Social prices
Milk revenue	40420.00	57228.55
Birth revenue	21368.07	23448.46
Wool revenue	91.28	356.23
Harmonized meat revenue	3417.80	3908.07
SUM	65297.15	84941.31

Source: Field survey.

Syria. To calculate the final indicators for informed decision-making, the items in the (Table 6) are used.

The nominal protection coefficient (NPC) on tradable outputs (NPCO), defined as A/E, indicates the degree of output transfer, the NPCO value for the sheep industry is (0.77<1). The results indicated that policies have caused the domestic output price of the sheep industry in Al-Hasakah district, Syria to be less than the social price by 0.23. In other words, the value of total output was 0.23 lower than it would have been in the absence of the policy. Thus, the current price of sheep products has indirectly provided an incentive for the development of sheep industry in Al-Hasakah district, Syria, according to research conducted on sheep by Elbadawi *et al.* (2012), contrary to research by Osman *et al.* (2006) and Zainalabidin *et al.* (1995).

The nominal protection coefficient (NPC) on tradable inputs (NPCI), defined as B/F, shows the degree of tradable input transfer. An NPC on inputs of 1.05 shows that the domestic input cost is greater than the input cost at social prices and the system is taxed by policy. In other words, the value (1.05>1) suggest that rearers were paying approximately 0.05 more for their tradable inputs than if they obtained them at their respective social price. This difference indicates that the policy provided

Table 6. Policy Analysis Matrix of the sheep industry in Al-Hasakah district, Syria (Unit: SP. head^{-1})

Items	Revenue	Costs		Profit
		Foreign (tradable)	Domestic (non-tradable)	
Private prices	A	B	C	D
	65297.15	31155.54	6756.79	27384.83
Social prices	E	F	G	H
	84941.32	29765.08	6258.27	48917.97
Divergences	I	J	K	L
	-19644.17	1390.45	498.51	-21533.1

Source: Calculated from Table 4 and Table 5.

a 0.05 tax per unit of tradable input that was paid by domestic rearers, according to research conducted on sheep exports by Babiker *et al*. (2010).

The effective protection coefficient (EPC) is the ratio of the difference between revenues and tradable-input costs in private prices to that in social prices. In PAM notation, EPC = (A-B) /(E-F). The numerator of EPC, A-B, is value added in private prices; the denominator, E-F, is value added in world prices. The ratio thus shows by how much policies in the product markets cause observed value added to differ from what it would be in the absence of commodity price policies. EPC is an indicator of the net incentive or disincentive effect of all commodity policies affecting prices of tradable outputs and inputs. An EPC (0.62<1) that indicates the net effect of policies that alter prices in product markets is to reduce private profits by 0.38 and the combined transfer effect is thus negative. In other words, the absence of Government support and taxes imposed on sheep industry would reduce profits by 0.38, according to research conducted on sheep by Elbadawi *et al.* (2012) and Osman *et al.* (2006), contrary to research by Zainalabidin *et al.* (1995).

The domestic resource cost ratio (DRC), defined as G/(E-F), serves as a proxy measure for social profits. the DRC value of 0.11<1, there by indicates that the value of domestic resources used in sheep industry is lower than the value added. This implies an efficient use of domestic resources in sheep industry and that was socially profitable. In other word there is high efficiency in the rearers use of local resources and this means achieving a profit for the reares of 0.89, so it is better to expand the production of sheep locally. Consequently, the Al-Hasakah district, Syria has a comparative advantage in sheep industry, according to research conducted on sheep by Sembiring (2017) and Elbadawi *et al.* (2012) and Emam and Salih (2011) and Osman *et al.* (2006), contrary to research Zainalabidin *et al.* (1995) in Malaysia stating there is no comparative advantage in Sheep Industry.

Conclusions

In conclusion, this study endeavored to measure the NPCO, NPCI, EPE and DRC of sheep industry because of the interest shown by policy-makers in the prospects of integrating sheep rearing with plantation crops to maximize income from agriculture. The analysis pointed out the overall effect of the policy, indicates the effects of negative incentives (taxes) and there are taxes levied on the inputs, and the rearers pay more for those inputs if their trade is free. Finally, the sheep industry in Al-Hasakah district, Syria has a comparative advantage, so that it has a bright prospect in the development and export activities. Further research and development should be continued, especially in large-scale rearing; adapting the animals to local conditions; and sheep rearing in the livestock sector. Research and development should also be continued to overcome the current technical constraints.

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