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Livestock and food security in the Arab region: policy framework

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Abstract Livestock keeping constitutes a traditional and important economic activity in the Arab region. This paper aims to assess the role of the Arab livestock sector in food and nutritional security in terms of demand, supply, national policies and trade in the light of major environmental constraints, with data illustrations from Morocco (Mediterranean country) and Saudi Arabia (oil-rich country). Demand for livestock products is increasing in the Arab region driven by the growing population with different degrees of increased urbanization and wealth. On the supply side, local livestock production is largely based on rainfed mixed and pastoral livestock systems making it vulnerable to the effects of climate change and water scarcity. Intensive systems, where present, are mostly dependent on feed imports with an important water footprint. Livestock production is further conditioned by a history of arbitrary national policies that had a particularly negative effect on small producers and contributed to the degradation of national resources. Arab countries rely on trade from the world market to fill their gap in animal feed and livestock products with varying trading power based on wealth and the availability of free trade agreements. Following analysis of the sector, the paper concludes with the proposition of a pro-poor policy framework for the development of a sustainable Arab livestock sector.

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Introduction

Livestock keeping is a traditional activity in the Arab countries. In addition to serving as a source of nutritious food itself, livestock is a significant contributor to smallholders' livelihoods and to the national GDP (Behnke 2012; Elzak et al. 2011) in most Arab countries. Livestock serve as a year-round versatile asset, a readily available source of food or income, and a source of pride, social values and status (Hassane 2013; Otte et al. 2012; Rota and Thieme 2009).

Demand for livestock products in particular is driven by the increased urbanization and wealth of the growing population with large variations between Arab countries. Furthermore, a major distinction should be noted regarding the countries' relative richness in gas and oil which directly reflects on their national wealth and thus their demand for livestock products and their purchasing power in world food markets (Sulser et al. 2011).

Livestock in Arab countries are mainly raised in mixed or pastoral systems with varying productivity, with urban demand being increasingly met by intensive production. Factors affecting production and thus local supply, include the availability of arable lands and water resources that reflect on feed resources, subject to the effects of climate change in the prevalent arid and semi-arid environment (Hamadeh 2014).

An additional constraint facing Arab livestock production appears to be in the long history of arbitrary policies that further strained the scarce natural resources, particularly water (Haddad et al. 2011). Based on the above description of production constraints and growing demand, Arab countries are challenged to satisfy their food requirements from world markets, making them particularly vulnerable to market volatility, thus becoming greatly food insecure (Haddad et al. 2011; Lampietti et al. 2011; Shideed et al. 2014).

Food security entails having access to sufficient, safe, nutritious food to maintain a healthy and active life with livestock playing a major role to that end (Smith et al. 2013). Based on this premise, this paper presents an analysis of the current status of the Arab livestock sector covering the major factors affecting it: demand as related to changing demographics, and supply factors including feed and water resources, as well as the impact of national policies and trade. The paper makes use of data from two countries for illustration: Morocco is one of several Mediterranean Arab countries with prevalent mixed livestock systems. It has recently updated its national agricultural policies and established trade agreements especially with the European Union (EU). Saudi Arabia is one of the oil-rich Gulf Cooperation Council (GCC) countries. It used to have mostly pastoral livestock systems making use of its arid environment but has shifted to more capital dependent intensive systems. It is a member of the World Trade Organization (WTO) and has experienced major changes in its agricultural policies over time. This analysis aims to assess the role of the Arab livestock sector in food and nutritional security in the light of production and environmental constraints. The paper ends with a pro-poor policy framework that is proposed for the development of a sustainable Arab livestock sector.

Sector analysis

A continuous rise in livestock product demand in Arab countries has been observed for the last decade (FAO 2003) along with an important increase in population. Although a drop in population growth rate to 0.8 % is expected by 2045–50, this would still be double the expected rate of 0.4 % for all developing countries. Within this overall framework, great variations exist between Arab countries. Least developed countries such as Somalia, Sudan and Yemen, are expected to maintain high growth and fertility rates, while others that are more developed (Lebanon, Tunisia, Kuwait and United Arab Emirates) already show replacement fertility rates comparable to those witnessed in developed countries (Mirkin 2010). These demographic projections reflect an expected aggravation in food insecurity, poverty, unemployment, urbanization and immigration, especially in the poorest countries. In fact, a general increase in urbanization as well as increased wealth in a few countries is observed, driving a surge in animal products consumption (Badran and Laher 2011). Meat consumption is expected to increase by 104 % and milk consumption will increase by 82 %, by 2030. Increases in consumption of animal products will be more pronounced in oil-rich countries—nearly doubling from 2000 to 2030—driven by surging income and population growth, according to the World Bank, FAO and IFAD report (2009). This highlights the role of livestock in ensuring nutritional security in the Arab region. However, reports on the subject note wide differences within countries largely based on dietary habits and wealth (Musaiger et al. 2011). With these differences, the Arabs face opposing nutrition related health threats: the negative effects of high fat and meat consumption in rich countries on one hand and anemia and nutritional deficiencies in Arab poor on the other hand, when animal product consumption is low.

On the supply side, the increase in livestock production fell short of the demand in many Arab countries in spite of important animal inventories. Livestock production systems range from pastoralism to high intensification, with the majority being rainfed mixed systems on which most of the rural Arab poor rely, with 75 % of them deriving more than half of their income from livestock as source of livelihood (Aljaloud et al. 2011; ARABSPATIAL 2016; Behnke 2012; Hamadeh 2014). Productivity and efficiency vary widely between the extensive and intensive systems as well as their impact on natural resources, the environment and rural livelihoods (Smith et al. 2013). These differences are noted in the text for their importance in discussing the different options for the development of the livestock sector and their respective consequences.

Table 1 shows that Mediterranean countries with widely spread mixed farming systems, such as Morocco, have the potential to satisfy most of their domestic demand in fresh cow's milk and chicken meat. Saudi Arabia data indicate high intensification of the dairy sector as reflected in the high productivity of a relatively small animal number, and a large poultry sector. Shortages in meeting the local demand, as reflected in the production to supply ratios, are mostly met by imports. The growth in the sector between 2000 and 2013 is evident in both countries.

Feed cost and availability constitute a major constraint for the development of livestock operations, especially in the Arab countries where local feed production is limited, given the scarcity of arable land and water. Cereal production in the region is mostly rainfed, with low productivity. Therefore, feed availability and pasture conditions are highly seasonal and unpredictable depending on climatic and disease conditions. The scarcity of water resources implies that increasing the irrigation level to improve production is not a sustainable option (Lampietti et al. 2011; Peacock et al. 2003). In the Middle East and North Africa region, which comprises a large number of the Arab countries, it is estimated that available renewable water will be as low as 500 cubic meters per capita and that arable land will shrink to 0.12 ha per capita by the year 2050 (World Bank, FAO and IFAD 2009). The area will also be hard hit by the effects of global warming with temperatures that could increase by 4 °C in some countries and a decrease in rainfall of more than 30 %, thus making the region threatened by desiccation. Naturally, this will affect the agricultural yields which are expected to decrease by 21 %, with a decrease in value of as much as 40 % in some Arab countries

Table 1 Cow's milk and chicken meat production in two Arab countries and related number of animals

Livestock item	Morocco		Saudi Arabia	
	2000	2013	2000	2013
Milk cattle (head)	1,308,000	1,606,000	84,286	250,000
Milk production (tons)	1,184,500	2,300,000	710,000	2,085,000
Milk production (excluding butter) to domestic supply ratio [a]	94 %		84 %	
Chicken meat (×1000 head)	313,400	521,000	488,833	581,100
Chicken meat production (tons)	267,000	657,000	483,700	576,684
Poultry meat production to domestic supply ratio[a]	100 %		43 %	

[a] This figure is based on 2011 data, the latest available from the source

Source: Compiled from FAOSTAT 2016, FAOSTAT website, http://faostat.fao.org/

(Brown and Crawford 2009; Elasha 2010). Consequently, these countries remain net cereal (including feed) importers with imports varying depending on the needs for each year (USDA 2015, 2016); for instance, Saudi Arabia stands as the leading barley importer from the EU acquiring on average 32 % (Average 2010–2014) of the total EU production while Morocco imports 2 % of the production (EC 2016).

Under these conditions, industrial animal production in Arab countries, as a means for meeting the domestic demand, becomes particularly costly at the ecological level in comparison to imported or local extensively produced animal products. The ecological cost is mostly represented by the virtual water footprint of these systems. In the case of live animals this includes "the water content of their feed and the volumes of drinking and service water consumed during their lifetime" (Chapagain and Hoekstra 2003). The Middle East countries in general are heavy net importers of "virtual water" in relation to livestock trade with an import balance estimated at 13.6 Gm^3/yr. Breaking down this water footprint, feed production seems to be the highest contributor to the livestock production's global footprint, as compared to grazing and direct water needs. Consequently, the heaviest water impact of the intensive livestock production systems, such as dairy and poultry, is indirectly through their high dependency on concentrate feeding while the animal production system that puts the least pressure on freshwater resources is based on crop residues, waste and roughages feeding (Chapagain and Hoekstra 2003), such as commonly practiced in the traditional mixed and pastoral livestock production systems that are widely prevalent in Arab countries (Hamadeh 2014).

As stated earlier, Arab countries rely heavily on imports to fill the gap between their local supply and demand for food, including livestock products. Figure 1 shows the discrepancy in the scale of imports between the Gulf Cooperation Council (GCC) and other Arab countries viewed in combination with population numbers. The figures show that the demand for livestock products in GCC countries disproportionally exceeds that of other countries, given their relatively small population numbers. Figure 1 was compiled from data available through the FAOSTAT website. This is a reflection of the economic factor and wealth distribution within the Arab countries, since economic growth is reflected directly on consumption and demand for livestock products (UNEP 2012).

National Policies

Agricultural policies in the Arab region up until 1997 were generally centred on self-sufficiency (instead of self-reliance based on comparative advantage basis) and characterized by lack of coordination and integration within a unified Arab framework. These policies led to weak trade and poor inter-Arab agricultural investments. According to the AOAD report (2008), this development favoured the rise of national protectionism, which in turn, caused negative effects from policies favouring trade, investment and finance at the expense of the agricultural sector. Furthermore, despite the fragile food security situation, most governments in the region have made little adjustment to their agricultural budgets and investments, which remain relatively low (Sulser et al. 2011). Hamadeh et al. (2015) and Hamadeh (2014) reported a description of

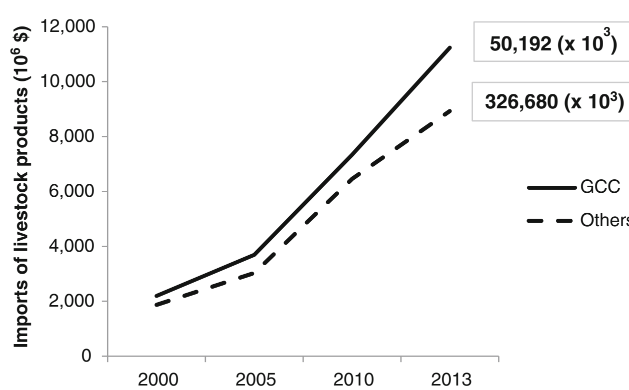

Fig. 1 Import of livestock products in GCC and other Arab countries (in Millions of Dollars), numbers in boxes refer to the human total population numbers in 2011. (Data extracted from FAOSTAT 2016)

the Arab national policies in relation to the livestock sector as detailed in the following sections.

The livestock sector was affected by this long history of arbitrary policies that strained economic development and led to the degradation of the scarce natural resources available to support it. The chain of events leading to this situation was fuelled by important changes during the second half of the past century, most importantly the rapid increase in wealth and population numbers leading to high demand for livestock products. Consequently, Arab countries introduced policies to increase production to meet the rising demand. However, these policies have been centred on the provision of cheap food for the urban population, leading to interventions that were 'urban biased', disregarding the needs and impacts on rural farmers and natural resources (Dixon et al. 2001).

The major livestock related interventions are summarized as follows (compiled from Oram 1998; Al Rowaily 1999; Bourn 2003, and Rahman 2011):

1. Price support for livestock, directly for animal acquisition and indirectly through subsidized feed prices: this has led to increases in the number of animals irrespective of the available resources to sustain them and benefiting large scale farmers at the expense of smallholders.
2. Subsidies and price support for cereals: increased cereal production was a major aim for most Arab countries often at the expense of other agricultural activities, including livestock production. This led to agricultural encroachment into marginal lands and drainage of water resources, exacerbated by the subsidy of fuel and mechanization.
3. Nationalization of grazing lands and attempts to sedentarize nomads: livestock owners and farmers had open access to rangelands, thus leading to soil and biodiversity erosion and land use conflicts.
4. Subsidized selected veterinary services: some governments opted to intervene for the improvement of the livestock sector through vaccination against economic diseases and other veterinary services. This has helped to maintain large numbers of animals.

Such policies have resulted in an imbalance between livestock numbers and feed resources, leading to heavy reliance on government support or shifting to other activities, mainly in urban areas. Over time, and in the light of climate change, fuel and food price changes, and under international pressures, some governments opted for additional policies that were also not adapted to the needs of their rural populations and smallholder producers. These included the withdrawal of the subsidy arrangement at a time of increased fuel and food prices, leaving farmers with little protection against price shocks and drought spells that forced them out of agricultural activities (De Chatel 2014). Similarly, the focus on increased production benefited large producers at the expense of rural smallholders who were negatively targeted by national policies and were left out of international support (Verhoeven 2011). This history of unsustainable policies has aggravated the vulnerability of the rural livestock farmers to poverty, food insecurity and climate change, creating an economically and socially delicate balance with the constant threat of strife over water and land resources within and across countries.

The following is an overview of the relevant agricultural policies in Saudi Arabia and Morocco as examples. The AOAD (2008) described relevant agricultural policies in Arab countries and is used as a reference, among others, in the section below.

Morocco The livestock sector in Morocco is well developed, benefiting from government support in terms of veterinary services in addition to loans for farmers to acquire new technologies and invest in the sector. Furthermore, the sector is supported by high import taxes reaching 339 % on red meat, 112 % on dairy and 128 % on poultry meat. 'In Morocco, the main agricultural policy objectives are food security, the improvement of farmers' incomes and the conservation of natural resources. The new Plan Maroc Vert adopted in 2008 aims to make agriculture the engine of economic growth in the next decade, through two pillars: high value added activities and strong export performance on one side, and "Agriculture Solidaire" oriented towards the smallholder farmer sector on the other' (Belghazi 2013).

Saudi Arabia In the late 1970s, Saudi Arabia set a target of achieving self-sufficiency in wheat, leading to the cultivation of large areas of the crop that were 100 % irrigated (Nowshirvani 1987; Al Al-Saleh 1992). However, with the increasing concern about the depletion of the country's non-renewable water resources, the government launched a new policy to gradually phase out wheat as well as forage production by 2016 (USDA 2015). However, SA remains a major dairy producer among Arab countries under large and highly sophisticated intensive systems with heavy reliance on feed imports, mainly from the EU. The latest policies target the efficient use of resources, especially water, for optimal productivity and economic feasibility of various agricultural activities. In addition, as a member of the WTO SA has refrained from subsidizing exports and endeavours to improve cooperative work, product certification (SaudiCert) and infrastructure, especially in relation to refrigerated transport and storage. On the other hand, the traditional sheep, goat and camel pastoral systems suffer from the degraded state of the grazing lands for the reasons cited above (Al Rowaily 1999).

Impact of trade and policies

The above analysis shows the heavy reliance of Arab countries on imports to satisfy their needs for livestock products;

when local production is sufficient, the sector will still depend on feed imports to support it. Consequently, trade policies and agreements have major impacts on determining the future of the sector. In fact, following the food price shocks that took place in the past decade, Arab governments responded first through amendments to their trade and tariffs policies. Lampietti et al. 2011 provide a brief overview of the major changes that were put in place in some Arab countries.

One important trade trail that is of interest to the Arab livestock sector is the inter-Arab and African trail. This market is most dynamic in live animal trade between African and non-African Arab states, while livestock products are mostly procured from non-Arab countries. Hamadeh (2014) presents a summary analysis of this trade sector as briefed in the following section. The GCC countries seem to be the drivers of this trade with live sheep, goats and cattle imports from Yemen, Sudan, Jordan, Syria, Iraq and other non-Arab countries although the actual statistics of the across border animal movements are difficult to verify (Bourn 2003).

Many factors render this trade sector vulnerable thus threatening the livelihood and food security of the pastoral and agro-pastoral communities involved. These are described in several reports: “Cross-border Livestock Trade Assessment Report” (FEWS 2010), “Promoting intra-Africa trade in animals and animal products” (Mankor 2013), and “The Promotion of the Livestock Industry for Food Security in Africa and Arab countries” by Hassane 2013. They can be summarized as follows:

- Climatic uncertainty and drought spells leading to lower production
- Diseases outbreaks and weak veterinary and certification services leading to import/export difficulties
- Dependency on limited market outlets and lack of market information
- Lack of processing and diversification of exportable livestock products
- Constricting policies and political instability
- Lack of abattoirs and transportation infrastructure

Another trade route that is of particular importance to Arab countries, especially those around the Mediterranean basin, is with the EU. The following section presents a brief overview of the current agreements and on-going negotiations between different Arab countries and EU partners, based on the more detailed discussion available in Hamadeh et al. (2015). The main EU objectives comprise the strengthening of trade and investment relations as well as economic integration with the EU internal market, in particular through the establishment of Free Trade Agreements. Negotiation rounds were conducted with Morocco in 2013, while Jordan and Tunisia continued preparatory work. Progress was made with Jordan while the process slowed down in Tunisia in 2013. The Commission launched an exploratory dialogue on the DCFTA (Deep and Comprehensive Free Trade Agreement) with Egypt in June 2013, but developments stalled due to the political events in this country.

Morocco has an Association Agreement with the European Union as part of the Euro-Mediterranean Partnership (Barcelona Process). The agreement grants preferential treatment for agricultural and processed agricultural and fisheries products. It is the largest recipient of EU funds in the framework of the European Neighbourhood Policy (ENP) (EC 2015). Food and animal products added up to 20 % of total exports to the EU in 2015, while imports of agricultural products from the EU were less significant, ceding place to industrial products (EC Trade Statistics 2015). An action plan foresees deepening of trade relations and cooperation in social policies, including structural reforms in the agricultural sector towards the establishment of a Morocco–EU free trade area. Considerations include the development and promotion of quality products, investment incentives, improvements in market chains as well as rural infrastructure and diversification. In December 2015, an EU tribunal ordered the annulment of the trade agreement with Morocco based on the inclusion of the disputed Western Sahara territory. However, the EU appealed the decision and confirmed its commitment to its partnership with Morocco (CURIA 2015; EU Neighbourhood Info Centre 2016).

Saudi Arabia (SA) is part of the Gulf Cooperation Council framed in 1988 for economic and political cooperation that seeks to improve trade relations and stability as one strategic goal. The Gulf Cooperation countries are classified as high-income economies and accordingly do not benefit from preferential access to the EU market. The aim of negotiations for a Free Trade Agreement was the reciprocal liberalization of trade, but negotiations were suspended in 2008. Agricultural products imports to the GCC countries add up to 8.7 % of total import from the EU (11.0 % for SA, 8.4 % of which are food and live animals), while agricultural export is as low as 0.3 % (0.2 % for SA) (EC Trade Statistics 2015).

Trade relations between the EU and the Arab countries are asymmetric and sensitive to political developments in the region. Limited agricultural trade flows into the European Union that does not change competition or labour market structures and is therefore not considered a threat by European farmers. For the Arab countries, in contrast, European market access is important, with total trade volume accounting for 51.0 % in Morocco and 24.7 % for the GCC in 2015 (EC Trade Statistics 2015). Exports of fruit, vegetables and olive oil contribute significantly to economic growth. Imports of meat and animal feed as well as manufactured goods and technology considerably shape national supply and agricultural value chains. Table 2 data indicate a significant increase in reliance on EU imports in meat over the past 5 years.

Meat trade with the EU is governed by special considerations. The EU livestock sector enjoys important subsidies, including export subsidies, and is largely protected through tariffs. Although pressure has been mounting to reduce these protectionist and market-distorting arrangements, an important barrier to meat trade from developing countries to the EU remains due to the high level of sanitary and phytosanitary standards that are in place as food safety protection measures for the highly selective EU consumers. Livestock producers in developing countries often lack the means to implement such measures and consequently fail to meet the requirements for entry into the EU meat market (Banović and Ševarlić 2013).

Several studies have attempted to project the effect of different trade scenarios on agriculture, including livestock, in Arab countries. Parra et al. (2016) simulated the effects of major trade agreements that are currently in place between selected Middle East and North Africa (MENA) countries, most of which are Arab countries, and the European Union (EU), US, Turkey, and inter-Arab agreements. The analysis showed that Arab bilateral trade in general seems to benefit from the Great Arab Common Market (GAFTA) promising to improve inter-Arab integration. On the other hand, the current Free Trade Agreements (FTA) between selected MENA countries and Europe seem to favour imports from Europe but not exports from MENA. The study also highlights emerging new markets for trade such as Turkey.

Another interesting analysis by Taskiridou et al. (2010) models the effects of three theoretical scenarios in trade reforms on agricultural trade in the MENA region. Livestock exports seem to be most increased under a scenario of global reforms allowing for special provisions to be granted to MENA countries and a gradual implementation of the reforms of a more limited EU-MENA FTA shows the lowest change in livestock products export and import.

Others analysed the impact of the free trade scenario on agriculture trade in the GCC countries in particular (Vanzetti and Peters 2010). The analysis showed a major drop in livestock and sheep meat imports. These would be expected to have a negative impact on consumer welfare in the GCC countries. On the other hand, the expected drop in poultry prices reflects positively on consumer welfare.

Adapting policies for the future

Arab countries have been revising their agricultural policies lately in response to the 2008 food security crisis. Smith et al. (2013) briefly outlined the sometimes controversial role of livestock in food and nutritional security: at one end of the spectrum, extensively raised livestock can greatly contribute to poverty alleviation through the transformation of poor quality vegetation and land, which is of limited use for other products, into valuable economic products (milk, meat, egg). At the other end of the spectrum, intensively raised livestock globally compete with humans for the production of food, mainly cereals, and pose a risk for the environment through greenhouse gas emissions. The authors highlight the importance of targeting the smallholder mixed livestock systems in future research, development and policy approaches in view of their role in food and nutritional security of the rural poor. Accordingly, in the following section, the aim is to review the most important policies and reforms in the light of the FAO Pro-poor Livestock Initiative (FAO 2010a). This reference resource is chosen since it focuses on the smallholders and rural poor working with livestock who are the most vulnerable to changes in the sector as related to climate change, policy modifications or trade agreements. The section below is based on Hamadeh et al. (2015).

Policy recommendations should address transition and restructuring within the agricultural sector in order to tap into the global and local increases in demand for livestock products while keeping in mind the sustainability of natural resources and of smallholder livelihoods. For the development of the livestock sector in Arab countries, the proposed resource for selecting the appropriate country-specific policies is the 'menu' developed by the FAO Pro-poor Livestock Initiative (PPLI) (FAO 2010a). The 'menu' targets a balanced increase in production and productivity of the livestock sector while at the same time reducing poverty and environmental degradation. The following is a brief summary of the main domains for policy interventions with examples of relevant approaches adopted in Morocco and Saudi Arabia.

1. 'Managing the basics of livestock production': consists mainly of public actions to 'provide livestock keepers with adequate and secure access to basic production inputs, such as land, feed and water for animals, and help them to cope with risks and shocks such as natural disasters and price swings' (FAO 2010b).

- Given the prevalence and importance of pastoralist and mixed farming systems in the Arab region, access to land is of prime importance. Communal land access based on the time-tested Hima rotational system[1] was heavily compromised by previous policies, however the PPLI initiative highlights the validity of such approaches in conserving pastures for sustainable production.
- Rangelands were largely degraded in Morocco and Saudi Arabia due to a combination of environmental constraints, policies, human expansion and animal

[1] Hima: Grazing reserve for restricted use by a village community, clan or tribe, set aside to allow regeneration as part of a grazing management strategy (Kilani et al.: A Way of Life, IUCN West Asia Regional Office, Amman Jordan – SPNL Beirut, Lebanon, 2007:3).

Table 2 EU imports of bovine meat, milk and cream, poultry meat and fodder and straw in two representative Arab countries

Imports from EU (€) Livestock products	Morocco			Saudi Arabia		
	2010	2014	% change	2010	2014	% change
Bovine Meat	5,208,474	6,266,339	20.3	712,158	5,497,020	671.9
Milk and Cream	564,540	504,984	-10.5	142,064,792	171,513,234	20.7
Poultry Meat	20,372,007	47,796,264	134.6	179,098,944	232,831,348	30.0
Fodder and Straw	6,547,613	2,621,521	-60.0	14,279,813	14,381,409	0.7

Source: Compiled from EC Market Access Database 2016, http://madb.europa.eu/madb/statistical_form.htm

population growth at their expense. This situation is being addressed in Plan Maroc Vert through the conservation of natural resources including pasture lands.[2] Saudi Arabia's land use policies are being studied for optimal productivity and sustainability (AOAD 2008; 2009).

– In addition, Saudi Arabia issued a decree terminating wheat production in the Kingdom by 2016 due to its heavy toll on non-renewable water resources. Saudi Arabia is also shifting towards investments in agriculture abroad (King Abdullah's Initiative for Agricultural Investment Abroad, Al-Obaid 2010), in order to ensure a steady supply of agricultural commodities, especially cereals, that can't be satisfied by domestic production (Al-Tkhais 2014). In spite of an original high interest in this direction, the projects that have effectively materialized and are well documented are few (Harrigan 2014; Woertz 2013). Many obstacles faced these ambitions, including political instability and lack of adequate infrastructure in target countries as well as financial reasons. Geographical distance was also a barrier against announced projects in South-East Asia (Keulertz and Woertz 2015; Woertz 2013). In addition, the sustainability and success of this approach is also linked to its impact on the food security of the affected poor communities in the host countries (Zurayk et al. 2011), an aspect that was largely overlooked in target countries such as Sudan (Verhoeven 2011; Tanyeri-Abur and Elamin 2011).
– Additional strategies are also being explored by Saudi Arabia and other GCC countries including the increase of their strategic storage capacity, improving their alternative trade options and other domestic food related approaches (Keulertz and Woertz 2015; Woertz 2013), in order to mitigate supply risks from international markets.
– On another note, most of the surveyed Arab policies lack a clear approach for coping with shocks to the sector and protection of the most affected smallholder farmers, an important factor in securing production. A review of the prevalent subsidy systems for improved efficiency and sustainability is needed, based on sound economic studies and in the light of effective trade agreements (Raboy et al. 2013).

2. 'Enhancing livestock productivity': includes policies and programmes aiming to 'facilitate farmers' access to animal health services, credit and output markets—both national and international—all of which are critical for farmers to generate and market production surpluses and for improving livestock's contribution to household incomes' (FAO 2010b).

– Health, financial, infrastructure and marketing services vary widely and most often fall short of reaching smallholders and the poor, where they are most needed. Support at this level is greatly needed, with a strong potential to revive local food systems and facilitate their development through access to local and external markets as well as improving their sanitary and phytosanitary standards (SPS) for improved food safety and marketability (Perry et al. 2005).
– Morocco has placed an important weight on improving productivity across the value chain in the Plan Maroc Vert policy reform; in addition, it established an agreement with the EU to support the second pillar of the Plan, concerning the support of smallholders, with €70 million. Saudi Arabian policies focus on improving productivity and efficiency by investing in better infrastructure, cooperative work, product quality standards, marketing, and trade agreements (AOAD 2008; 2009).

3. 'Sustaining livestock productivity': covers policies and programmes on 'research, environmental protection and all other public actions necessary to support the sustainability and competitiveness of livestock farmers in the medium to long term' (FAO 2010b).

– Agricultural research in most Arab countries is poorly funded and is often centred in a few research stations or universities with variable linkages to farmers' needs. As per the PPLI, a more participatory approach is greatly

[2] See Plan Maroc Vert (2009), http://www.fao.org/fileadmin/user_upload/FAO-countries/Maroc/plan_maroc_vert.pdf

needed to facilitate the two-way flow of information and to make sure the most pressing issues are being studied in a timely manner.

– Environmental protection is another challenge in Arab countries, especially given the current unregulated development of the livestock industry, driven largely by the private sector in response to increased demand. Morocco and Saudi Arabia have adopted policies to improve the sustainable use of their resources, especially in response to climate change and increased desertification and resource depletion. These include reducing irrigated cereal/feed production and shifting to more economically competitive and/or environmentally sound land uses (AOAD 2008; 2009). Shideed et al. (2014) highlighted the potential of an integrated agro-ecosystems approach such as alley-cropping of fodder shrubs with barley in mixed livestock systems for increased feed production under arid conditions and reduced soil erosion. "Sustainable intensification for more productive, profitable and diversified dryland agriculture…" is proposed by Shideed (2011) as a key research theme to explore in dry areas such as the Arab region.

Increased and sustainable productivity is an essential part of ensuring national Arab food security in livestock products. However, Arab countries will remain major importers of animal feed and livestock products to fill the gap in demand. Arab countries should benefit from on-going negotiations regarding free trade provided that advantageous special provisions are included in support of the livestock sector. Studies have highlighted the risk that Arab countries face regarding price shocks in global markets, particularly cereals, and present different strategies to mitigate this risk. At the same time, it was noted that global, regional and bilateral agricultural free trade agreements and negotiations, including inter-Arab agreements, play a major role as part of the food security strategy for the Arab countries through their effects on prices, tariffs, subsidies and other trade barriers that may be in place (Lampietti et al. 2011; Sulser et al. 2011).

Conclusions

Livestock are an essential contributor to food and nutritional security, particularly in the Arab countries where arid and semi-arid lands are prevalent. The Arab population is growing at a fast rate and becoming increasingly urbanized. With these changes, demand for animal products is increasing, particularly in relation to increased wealth in the GCC countries. Livestock supply from local production varies among countries with many factors affecting it including feed availability and natural resources that are strained by climate change. National policies are another factor that has impacted the livestock sector with mostly negative effects on smallholders livelihoods and natural resources. Animal products and feed imports play an important role in filling the demand gap in Arab countries. However, inter-Arab trade remains limited except for live animals, while the EU constitutes an important animal product and feed exporter to Arab countries. Bilateral, regional and global trade agreements, with a special focus on agriculture in general and livestock in particular, remain limited but have the potential to contribute to securing favourable conditions for market access, prices and availability of livestock goods as well as feed to satisfy the Arab market demands. Wide variation in agriculture and livestock among Arab countries exists at all levels and has been highlighted in this paper with illustrative data from Morocco (Mediterranean country with newly reformed agricultural policies) and Saudi Arabia (oil-rich country and heavy animal product and feed importer). Finally, a pro-poor livestock policy framework is proposed for the development of a sustainable Arab livestock sector, which promotes poverty alleviation and food security while respecting natural resources.

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