Concept Note for establishing Dairy Science Park Cairo (DSPC)

(Transformation of Livestock Resources of Egypt into a network of Entrepreneurship Models targeted at generating decent employment and exportable foods and biotech products)

Abstract: Livestock production in Egypt is a significant contributor to the nation's economy, supporting livelihoods, ensuring food security, and providing a source of quality nutrition to its growing population. Three key systems underpin this essential industry - the intensive, semi-intensive, and extensive bovine production systems. Each of these systems plays a crucial role in the Egyptian livestock sector, yet they exhibit distinctive characteristics, challenges, and opportunities. The Intensive Bovine Production System accounts for high-quality milk and beef production, essential for both domestic consumption and potential export. The Semi-Intensive Bovine Production System, while more disorganised, represents the majority of the bovine population and contributes significantly to the country's meat production. The Extensive Bovine Production System, although less productive per animal, plays a vital role in rural economies and provides a significant proportion of dairy products for local consumption.

Understanding the unique attributes of each of these systems is fundamental to our proposal for establishing the Livestock Technopark in Cairo. This project aims to innovate and optimise these existing systems, enhancing productivity, fostering sustainable practices, and creating entrepreneurship models. By doing so, we strive to generate decent employment, increase the output of exportable foods and biotech products, and further boost Egypt's livestock sector in the long term.

1. The Livestock Production Scenario

A consultation was made on bovine (dairy, beef) and poultry meat production systems in Egypt as agreed by key national stakeholders affected by the livestock sector, and notably the Ministry of Agriculture and Land Reclamation, the Ministry of Environment, and the Ministry of Health (ASL 2050, 2017. Country brief. Egypt. FAO, Cairo). It is the first time these stakeholders have ever embarked in a multi-disciplinary process to jointly define cattle and buffaloes (dairy and meat), and poultry meat production systems.

This process involved a three step approach: Based on their knowledge and expertise, the stakeholders agreed on a narrative description of the different livestock production systems. Stakeholders validated and improved cattle and buffaloes, and poultry distribution maps of the FAO Gridded Livestock of the World (GLW) and identified, for each administrative unit, the relative proportions of the different production systems. Three bovine production systems were defined as follows.

1.1 Intensive bovine production system

This system is characterised by high input and output livestock holdings accounting for over 7 percent of the total beef and dairy cattle and buffalo population of the country. It includes dairy and beef farms of various sizes and types, ranging from ten to many thousands of heads of cattle and buffalo, described as follows.

- There are approximately 14 390 intensive bovine production system farms registered.
- Exotic breeds are used for milk production and exotic and crossbreeds for beef production.
- Intensive bovine farms have regular access to veterinary services, including mass government vaccination programs against diseases such as foot and mouth disease (FMD), Rift Valley fever (RVF) and lumpy skin disease (LSD) and private supplied vaccinations against other endemic and infectious diseases such as brucellosis.
- Intensive beef and dairy farms produce approximately 84 000 tonnes of meat and 5 million tonnes of milk per year. Beef animals are sold through formal chains to butchers in large cities or directly to slaughter houses.
- Intensive beef and dairy production systems are the main source of quality milk and beef for Egyptian consumers.
- In all cases, production is highly dependent on imported feed ingredients – grains, milling by-products, added vitamins, minerals, fats/oils, and other nutritional supplements.

1.2 Semi-intensive bovine production system

This system, while utilising modern production and husbandry practices to some extent, is often disorganised. The number of heads per farm ranges, according to season, between 10 and more than 50. Improved local breeds dominate the semi-intensive system, which produce both beef and milk. The system may be described as follows.

- Semi-intensive farms comprise almost 60 percent of the total bovine population.
- Buffaloes are mainly used for milk production and supply more than 70 percent of raw milk.
- Milk is principally sold as liquid raw milk, with a small percentage processed into homemade cheese, butter and yoghurt. Surplus production supplies large cities through milk collectors and distributors. Few semi-intensive farms are contracted by large milk and milk processing factories.
- Animals are vaccinated during government mass vaccination campaigns against FMD, RVF and LSD. Semi-intensive cattle and buffalo producers depend on private practitioners for emergency and regular veterinary services, with limited access to governmental veterinary services. The semi-intensive bovine system produces the majority of meat in Egypt. Fattening of cattle and buffaloes is highly seasonal – dependent on feed availability and religious events – and animals are sold live either directly in livestock markets or to butchers in large cities.
- The semi-intensive production system provides a considerable share of the raw milk and meat preferred by consumers in urban Egypt. However, varied production practices, a scattered and unorganised farmer community, limited infrastructure, and unregulated value chains, make production and productivity highly variable, which limit the incentives for farmers to invest in productivity enhancing inputs

1.3 The extensive bovine production system

This system is characterised by low inputs and low outputs, with farmers keeping herds of between 1 and 10 indigenous cattle and buffaloes as well as some cropland. The extensive system is informal and so statistics are not always robust for this system, described as follows.

- Households in the extensive bovine production system keep about 33 percent of the total cattle and buffalo population in Egypt. The number of heads per farm ranges between 1 and 10 animals.
- Animals are largely fed with Egyptian clover (berseem), the key forage crop. Though corn leafs (darawa), hay and straw are also common, particularly in the summer.
- Milk production is self-consumed, used to feed calves and sold to neighbours or milk collectors. A minor share is processed into local made cheese and ghee for consumption by people in rural and urban areas. Again, these products are both for home consumption or sold in informal markets.
- Surplus young calves, bulls and unproductive females are sold in live animal markets. Few animals are slaughtered, except for special occasions such as weddings.
- Cattle and buffaloes are vaccinated during government mass vaccination campaigns against FMD, RVF and LSD and households rarely access other animal health services.

1.4 Conclusion on bovine dairy production

The ASL 2050, 2017 Consultancy concluded as follows. This common understanding of livestock production systems will support multi-sectoral and multidisciplinary dialogue among stakeholders to appreciate the production, public health and environmental dimensions of livestock and the formulation of coherent and effective sector's policies and investments.

2. USDA-FAS 2021 Report on Livestock and Products Annual

This report reveals that Egypt's national herd is largely composed of bovine dairy cattle (*Bos taurus*) and domestic water buffalo (*Bubalus bubalis*), split in a ratio of 55 to 45 percent, 4.7 and 3.8 million heads, respectively. Between November 2019 and February 2020, Egypt imported over 4,700 head of U.S. Holsteins dairy cattle.

Cattle production input costs are high despite the government authorising in 2018 an additional 400,000 hectares for yellow (feed) corn production. To lower cattle production costs, the government aims to increase feed corn yields to 12 metric tons (MT) per hectare by 2030. Feed costs per animal are 45 to 60 EGP ($3.76) per day, making it burdensome for the small-scale producer. Lack of water availability is also posing production challenges. The government seeks herd growth to increase domestic beef production, increase carcass weight, and help stabilise market prices.

3. Animal production complex in Yousuf El-Siddiq city in Fayoum

According to the directives of President Abdel Fattah El-Sisi, in the framework of the state's efforts to develop animal wealth and maximise its products and in coordination with the Ministry of Agriculture and Land Reclamation, the National Service Products Organization has planned to implement several integrated projects in this field and complementary

activities related to them. These projects are represented in the establishment of several farms for breeding and stall-feeding cattle and other farms for raising livestock for dairy production and the creation of modern integrated automatic abattoirs in addition to factories for various dairy and meat. This is done in pursuit of the following:

1. Contributing with the specialised state agencies to reducing the food gap regarding one of the most important sources of protein and providing them in large quantities, high quality and appropriate prices.
2. Reducing the import rates of some important food items, such as meat, poultry, and some dairy products.
3. Contributing to the implementation of productive projects that support comprehensive development plans in Egypt and enhance their national security, especially food security for citizens.
4. Achieving mutual complementarity between the activities of the diversified National Service Products Organization, such as agricultural production projects, feed factories, animal production projects and dairy factories. This aims to cover investments return and reduce the costs of the final products.
5. Providing many job opportunities that are suitable for all specialties and qualifications.

4. Veterinary Education Scenario

The following faculties of various universities are imparting education in animal health and production, which need to be integrated with the industry and government policies, aimed at development and replication of entrepreneurship models across livestock value chain:

1. Faculty of Veterinary Medicine-Cairo University
2. Faculty of Veterinary Medicine-Alex University
3. Faculty of Veterinary Medicine -Assuit University
4. Faculty of Veterinary-Suez Cannel University.
5. Faculty of Veterinary Medicine-Minia University
6. Faculty of Veterinary Medicine-Monifa University
7. Faculty of Veterinary Medicine-South Valley University
8. Faculty of Veterinary Medicine-Benha University
9. Faculty of Veterinary Medicine-Beni-Suef University
10. Faculty of Veterinary Medicine Kafrelsheikh University
11. Faculty of Veterinary Medicine-Sohag University
12. Faculty of Veterinary Medicine-Mansoura University
13. Faculty of Veterinary Medicine-University of Sadat City

5. Livestock Entrepreneurship Development Scenario

The Egyptian Cabinet-IDSC issued Policy Perspective, The Egyptian SME's Force Field Analysis 2020 in June 2021. They recommended that Entrepreneurs should hold accurate information among key stakeholders to maintain their confidence. Moreover, they must focus on supply chain assessment and risk management to utilise alternative modes of transportation and do trade-offs based upon needs, cost, service, and risk analysis possibilities. Finally, they should identify the components and raw materials which have the highest impact on their revenue streams.

6. The current livestock population and milk/meat production, imports and exports

Species	2011	2021	2011	2021	2011	2021
	Population (heads)		Milk production (tons)		Meat production (tons)	
Cattle	4,779,743	2,819,413	3,107,169	3,709,849	454,484	352,382
Buffalo	3,983,167	1,263,103	2,568,139	1,567,503	395,801	166,744
Sheep	5,365,065	2,239,210	95,500	65,814	73,637	55,782
Goats	4,258,175	862,172	18,500	28,666	18,500	28,666
Camel	136,930	99,610	DNA*	DNA	10,612	10,180
	Meat and Meat Products (1000 US$)		Dairy Products (1000 US$)			
Imports	960,469	1,208,851	583,859	618,088		
Exports	7,795	10,434	505,087	226,225		

NA: *Data Not Available (FAOSTAT 2023)

7. The Proposal for establishing Dairy Science Park Cairo (DSPC)

Based upon the above literature review and experience of the Dairy Science Park under Good Governance and Policy Reforms (2011-2023) suggesting two technoparks under FAO-UN and ITC-UN national consultancies, this proposal is submitted for establishing Dairy Science Park Cairo (DSPC) as an autonomous regulatory, financial and marketing authority, run by a Board of Governors representing all the stakeholders and an Endowment Fund. DSPC will support the public sector organisations as facilitators and the academia in generation of feasible entrepreneurship models across the Livestock based Value Chain (LBVC). The Major task of DSPC would be generation of decent employment and exportable hygienic/Halal certified food and biotech products.

VISION

To support the people of Egypt and other friendly countries in the Region, through generation of decent employment and exportable foods and biotech surpluses across the Dairy and Livestock Value Chain in line with UN-SDG Action 9671.

MISSION

Utilisation of the indigenous human and natural resources for welfare of the people through the triple helix model of Good Governance engaging academia, industry and government agencies, with focus on development of a network of entrepreneurship models.

Salient features

- DSPC would be supported, commissioned and hosted by Academy of Scientific Research and Technology (ASRT), Cairo.

- The concept of DSPC is in line with the Production Transformation Policy Review (PTPR) calling for scaling up productive investments and innovation, needed to unlock opportunities for all and achieve sustained and sustainable, job-rich growth. In its reform programme and development strategy, the country has placed a strong emphasis on digitalisation and greening and accelerating industrialisation through enhanced ties with the continent. Key recommendations were made for better capturing the gains of Industry 4.0, better harnessing the potential of industrial parks, and modernising the policy mix for economic transformation – responding to the challenge of fostering a knowledge- and innovation-based economy through enhanced partnerships and targeted investments.

- DSPC will be focusing on Dairy as the face and embed the meat and biotech products across the value chain as spokes. Centres of Excellence (CoE) would provide academic wisdom through advanced research and Livestock Entrepreneurship Development Centers (LEDCs) would provide the interactive platforms for academia, the private sector and the government agencies with the common goal of supporting development and replication of entrepreneurship models.

- The idea of DSPC is in line with the National Structural Reforms Program (NSRP) of Egypt launched in April 2021 under the auspices of the Ministry of Planning and Economic Development (MPED), calling for upgrading the governance and the efficiency of public institutions, through administrative and institutional reforms, empowering local administration units, and improving the governance of state-owned enterprises (SOEs). It was recommended that for better capturing the gains of Industry 4.0, the potential of industrial parks must be harnessed and the policy mix for economic transformation – responding to the challenge of fostering a knowledge- and innovation-based economy through enhanced partnerships and targeted investments, must be adopted.

- Dairy is the major activity of the livestock sector, hence Dairy Science Park has integrated it into its title, by both of us (Prof M Subhan Qureshi and Mr Abdur Rahman Ilyas) during 2010 at Cairo biotech conference. Hence the proposed park has been named as Dairy Science Park Cairo (DSPC) for integrating the producers, processors and service providers with the academia and government agencies at country level. Entrepreneurship models would be developed as postgraduate thesis research of the affiliated universities and would be handed over to LEDCs for replication under the Endowment Fund (EF). Focus areas would be the production of dairy, meat and biotech products.

- Let’s be clear on initiating the seven activities suggested under the Dairy Science Park Cairo (DSPC) as follows:
    - Year 1: Livestock Entrepreneurship Development Centers (LEDC) would be introduced as an academia-industry interactive activity. Entrepreneurship Development Program (EDP)/LMS/DNTAI/CDSFunds would be initiated. Funds have been allocated for during year 1, 2 and 3. Feasible ideas would be sponsored to demonstrate entrepreneurship models, to be registered as private companies. Existing startups and SMEs would be registered and facilitated for becoming registered companies.

- Year 2: Activities of Year 1 will continue and Endowment Fund would be established. Initial work would begin for mega activities highlighted for year 3.

- Year 3: Yes, the Business Incubation Centre will be established at Animal production complex in Yousuf El-Siddiq In the city of Fayoum and linked with academia and the private sector for replicating entrepreneurship models. The two centres of excellence (CEGAPH and CEBEL) would be established during the third year at the relevant universities with demonstrated academic excellence. Initial work would be completed during the second year and full fledged activities would be launched during the third year. The Biorisk Management, novel Animal Vaccine Production and Breeding ideas would be integrated into work plans of the two centres of excellence as per their capacity and engagement level.

COMPONENTS

7.1 **Livestock Entrepreneurship Development Centers (LEDC):** Egypt possesses dairy animals in the form of intensive, semi-intensive and extensive production systems. A multi-sectoral and multidisciplinary dialogue among stakeholders is required to appreciate the production, public health and environmental dimensions of livestock. Animal Recording System may be introduced for health and productivity indicators to enhance the per head productivity and control diseases. We suggest that the three production systems may be explored for entrepreneurship development through integration of good practices, value addition and marketing.

LEDCs may be established at appropriate points focused at developing and propagating entrepreneurship models across the Livestock Value Chain (LVC) under an Endowment Fund (EF), through collaborative efforts of academia, the private sector and government agencies, under the umbrella of DSPC.

7.2 **Business Incubation Centre (BIC):** Animal production complex in Yousuf El-Siddiq In the city of Fayoum has provided an excellent base for launching national programs in animal production, health, nutrition, housing, value addition and entrepreneurship potential of dairy cattle/buffaloes in collaboration with the universities. Postgraduate University Students may be involved in such activities for applied research and development of feasible entrepreneurship models. A BIC may be established for such purposes.

7.3 **Entrepreneurship Development Program (EDP):** ADP may be launched in collaboration of relevant universities for transformation of the feasible postgraduate research into entrepreneurship models. The academic disciplines may participate in investigating farming models, meat and dairy processing, shelf life of food products, packing, preservation, and marketing, production of semen and embryos, development of diagnostic kits, solar energy applications, quality control for hygienic and Halal standards, exports and import requirements. like theriogenology may contribute in studying commercial production of semen, embryos and other biotech products; pathology departments may work on production of diagnostic kits, etc.

This concept is in line with the Entrepreneurial Discovery Process (EDP), prioritising investments based on an inclusive and evidence-based process driven by

stakeholders' engagement and attention to market dynamics. It has been a core element of the European Regional Development Fund (ERDF) Enabling Condition "Good governance of national or regional smart specialisation strategy" for the period 2021-2027.

7.4 **Centres of Excellence (CoE):** The following two CoEs may be established at the relevant universities, where advanced and applied research has already been demonstrated: i) CoE for Genetics of Animal Production and Health (CEGAPH), to conduct applied research in genetic improvement for economic and survival traits of the indigenous livestock/poultry species and enhancing entrepreneurship potential through protocols development; ii) CoE for Biology & Entrepreneurship of Livestock (CEBEL) to integrate the biological knowledge of animal health, management, nutrition, breeding and reproduction with the entrepreneurship development potential across the livestock breeding value chain (LBVC).

7.5 **Digital Networking, Training and AI (DNTAI):** ForbesAdvisor (2023) reported on the Best Learning Management Systems (LMS) Of 2023. LMS, are software platforms designed to manage, distribute and track employee training. They are often used in corporate settings to deliver online courses and track employee progress. However, they can also be used in other ways, such as to provide compliance training or customer education. There are hundreds of LMS to choose from, each with its own strengths and weaknesses. Forbes Advisor analysed the best LMS options for small and medium businesses (SMBs), so you don't have to. Absorb has been found to be the best for enterprise businesses nutrition, breeding and reproduction with the entrepreneurship development potential across the livestock breeding value chain (LBVC).

Digital Services Portfolio (DSP) has been introduced by FAO-UN which aims at making useful data, information and statistics available and accessible as digital services to rural communities, by providing them digital agriculture advisories that leverage the knowledge of Countries, FAO and strategic partners in the mobile world. The DSP targets more specifically farmers, fishermen, livestock keepers, traders, extension officers, nutrition officers and other agricultural stakeholders in the field.

Artificial intelligence (AI) in animal farming was reviewed through a systematic literature review (J Cleaner Prod, 331:2022, 129956). AI solves the sustainable production needs on animal welfare, behaviour, disease, and environment management. Individual identification enables the farm managers to treat animals as individually tailored diets and environmental control for an optimal productivity. Also, it is an important step for the traceability of animal products through the supply chain. Up to date, ear tags and RFID technology are commonly used for individual identification of pigs, ruminants, and poultry. DSPC would utilise all these technologies in entrepreneurship development across the value chain.

7.6 **Capacity Development of Stakeholders (CDS):** Capacity development of stakeholders would enable them to play their due role in the entrepreneurial development process. International Livestock Research Institute (ILRI) has worked in this area involving the development of attitudes, skills, institutional set-ups as well as knowledge in agricultural research and development. ILRI works with individuals,

organisations and institutions engaged in research and development as well as those making agricultural investment decisions at all levels across the sector. The intentional and purpose-driven efforts are supported to increase the capacity of its stakeholders to undertake and use research to generate development outcomes and scale up in a sustainable manner. Dairy Science Park has worked intensively with the relevant stakeholders and has come up with policy reforms for engaging them with the overall vision of the technoparks. All such resources would be utilised for establishing DSPC. Functional Units (FUs) will be established at each affiliated agency for participation in the activities of DSPC.

7.7 **Endowment Fund (EF):** For an uninterrupted functioning of the FUs of DSPC, an EF (US$ 4 m of of the total cost of US$ 15 m, Annexure 1) would be established through provincial, federal and donor grants or private sector investment, for developing entrepreneurship models. The EF would be managed by DSPC and released to the FUs according to achievements and meaningful plans. The private sector would offer their land, animals, building and other assets for a period of at least 5 years with investment by DSPC and operational arrangements by private partners. The fund would be used for developing entrepreneurship models, providing facilities required at various affiliated centres and for establishing common facilities and processing units. Net profit for each project will be shared on a periodic basis among the relevant stakeholders.

DSPC would be supported, commissioned and hosted by Academy of Scientific Research and Technology (ASRT), Cairo.

Prepared and submitted today on 2 July, 2023, by:

Prof Dr Muhamamd Subhan Qureshi, President Dairy Science Park, 23-A, Industrial Estate, Hayatabad, Peshawar-25000/Ex-Dean Vet Science UAP, Pakistan; Mobile/WhatsApp: +92 300 587 7933; Email: drmsqureshi@gmail.com	
Prof. Dr. Saber Mohamed Abd-Allah, Focal Point DSP (Egypt), Dairy Science Park; Faculty of Veterinary Medicine, Beni-Suef University, 62511 Beni-Suef, Egypt; Tel: +20 111 482 2689 Email: abdallahsaber49@gmail.com; Website: http://abd-allah.webs.com;	
Mr Abdur Rahman Ilyas, Focal Point DSP (India), Advisor to the President, Academy Of Scientific Research & Technology, 101 Kasr Al-aini St, Cairo, Egypt; WhatsApp: +91 868 88 5 9628; Email: arilyas@asrt.sci.eg	

Annexure 1.

Cost Estimate (US$)

Item	Phase 1	Phase 2	Phase 3	Total
Consultancy International	80,000	85,000	95,000	260,000
Local Consultancy Support	120,000	140,000	150,000	410,000
Livestock Entrepreneurship Development Centers (LEDC)	250,000	450,000	1,000,000	1,700,000
Business Incubation Centre (BIC)	100,000	150,000	440,000	690,000
Entrepreneurship Development Program (EDP)/LMS/DNTAI/CDS	200,000	380,000	500,000	1,080,000
CoE for Biology & Entrepreneurship of Livestock (CEBEL)	150,000	140,000	1,350,000	1,640,000
CoE for Genetics of Animal Production and Health (CEGAPH)	100,000	300,000	1,000,000	1,400,000
Logistic Support	140,000	210,000	270,000	620,000
Endowment Fund (EF)	400,000	1,000,000	3,600,000	5,000,000
Miscellaneous	460,000	1,000,000	740,000	2,200,000
Total	2,000,000	3,855,000	9,145,000	15,000,000