

## **Possibilities for Developing of Camels in the Most Severe Arid Areas in the Arab World by Using Modern Biotechnology**

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**Abstract:** Camels are playing a major role in the achievement of economic and agricultural development in arid and severe aridity regions, under many environmental and severe food conditions where the other farm animals can't live or produce in such conditions. They are the best among the farm animals in the resistance of dryness and the scarcity of water and fodder and then carrying over the thirst and also the production of animal high protein nutritional value under these circumstances. Economically, they are the most efficient animals in arid and severe aridity areas, in terms of maintaining the grassland from degradation and overgrazing of their private pastoral behavior distinguished by the lack of focus on one area and grazing one part without another part of the plant, which is better qualified to turn the fork and halophytes to animal products rich in nutritional value. The research targeted the study of camel's development possibilities in very arid areas of the Arab World, using modern biotechnology. We have realized that camels are one of the most important sources of red meat in the Arab countries, which confirms the promising role in bridging the gap of red meat at the level of the Arab World, despite the decline in the number of camels and meat quantities in some producing countries as (Somalia) and that as a result of the change in social habits and consumption types of the Somali nomads, in conjunction with the environmental and climate changes accompanying droughts and desertification. The problem of the high mortality rate in newborns and financial challenges, as a direct result of the non-generalization of integrated pastoral farms capable to take advantage of the wealth, is one of the most important challenges and obstacles facing the development of livestock in the camel's sector in the Arab World. Therefore, the research recommended the necessity of the promotion of integrated development projects of camels in arid and severe aridity areas in the Arab World, to create a suitable climate to attract the Arab Investors and the involvement of the private sector, as the main pillar in the development of trade climate and investment for livestock, especially camels. Beside, the attraction of foreign investors in the investment in the camel sector and their products, under the environmental and the adverse climatic conditions and the current universal economic situation.

**Key words:** Severe arid areas • The Arab World • Modern biotechnology • Genetic superiority • Artificial insemination • Embryo transfer • Cloning or reproduction • Pipe camels

### **INTRODUCTION**

Camels are playing a major role in the realization of agricultural economic development in arid and severe aridity regions under adverse environmental conditions and harsh food, where other farm animals like cows, buffalo, sheep and goats can't live nor product in such circumstances, distinguished by anatomical and physiological characteristics and unique behavior [1].

NASA has confirmed that camel can bear temperatures up to about 110°C and this is may be attributed to the decrease in the degrees of temperature in the head of the camel in that case to about 20 degrees only because they have air ducts [2]. They are the best among the farm animals in the resistance of drought and scarcity of water and fodder, hence, they can bear thirst and above that, they can produce high nutritional value of animal protein under these circumstances. They are also the most

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efficient economically animals bred in arid and high aridity areas, in the preservation of grassland from degradation and overgrazing, due to their private pastoral behavior and characterized by the lack of focusing in one area, or grazing for a part without another of the plant. They are better qualified to transform the forage and halophytes, which are characterized by low nutritional value to animal products rich in high nutritional value. That's why it's worthy of a camel to be called the animal of the future that can contribute doubly in the animal food security. Herein, we can handle the weakness of pasture productivity resulting of the poor management and wrong practices exercised by livestock breeders, in addition to the absence of policies and plans aimed to develop the evolution of pastures and organizing the exploitation, by the expansion in breeding systems and taking care of camels in those pastures in order to the sustainability [3]. The research problem is represented in the decrease of the relative importance of the production of camel meat, from the most important three producing countries to the total production of red meat in the Arab World. In the light of the increasing of relative importance of the total production of camel meat in general in the Arab World to the total production of red meat, in spite of the suffering of the Arab countries from the presence of food gap in red meat and especially in areas that environmental conditions do not allow the widespread of other farm animals. That gap can be eliminated through the intensification of animal husbandry which suits the arid and severe aridity areas, especially camels which characterized by a high productivity of red meat under the conditions of those regions and for their economic importance, in the light of addressing the problem of high mortality rate in newborns, in conjunction with local and regional economic promotion of the importance of their milk and meat and food industries which are held on them, by using modern biotechnology applications.

The research aims to study of camels developing possibilities in severe arid areas in the Arab World, using modern biotechnology techniques, through the study of the evolution of the numbers of camels and the amount of meat produced in the largest producing countries and the relative importance of the amount of red- meat produced in the Arab World and to identify constraints and challenges facing the livestock development of camels, as well as to determine the prevailing breeding systems and the possibility of introduction of modern systems for breeding, using modern biotechnology applications, through the participation of the private sector in collaboration with the public sector.

## **MATERIALS AND METHODS**

**Data Sources:** The search depended on several sources of data represented in the secondary data published in the annual statistical book of Arab agricultural statistics and the unified Arab report, as well as some researches, economic studies and electronic search Internet sites relevant to the subject.

**Statistical Analysis:** The descriptive statistical analysis was used to explain and expose the various aspects of the theory relating to the environmental conditions, which identifies the livestock numbers of camels in the Arab World of breeding systems and determining the brands and also the potential of biotechnology in reproduction, for the development of their numbers and their meat. Also has been used the statistical quantitative analysis to study the evolution of animal wealth of camels in the Arab World. And the estimation has been made by using the single equation models and models were estimated in the appropriate image of the time developments.

## **RESULTS AND DISCUSSION**

**Specific Environmental Conditions for Livestock Numbers of Camels in the Arab World [4]:** The Arab World is prevailing very arid lands, where the estimated proportion of land that rainfall is less than the 100 mm are about 70% of the total area, that would lead to wider areas of natural pastures in Dry Areas (severe aridity) and semi-dry (arid) where feed resources fail to cover the actual needs of livestock in these areas resulting in low productivity growth of milk and meat and lower their growth rates and also lower their genital and numeric efficiency and in light of the economic and social changes that have occurred over the past few decades and has led to the intensification of the exploitation of dry and semi-arid areas by human systems, according to non-rational methods, relied on self-interest that led to the immediate imbalance between ecosystem elements and aspects of the spread of desertification [5], which requires us to rely on the investment of these areas and on the expansion of the breeding species and animal breeds, able to cope with the harsh environmental conditions. Egypt is considered as the number one desert's state in the world, according to International Classification of the belt separation countries by Meg scale, which shows that 86% of the territory of Egypt are classified under severe classification aridity (rainfall is less than 100 mm per year) and 14% of them are classified

as arid (rainfall less than 250 mm per year) and that Egypt receives rains generally with an average of 15 mm per year [3]. Despite of what has happened to severe aridity areas in the Arab World of degradation and desert encroachment.

In addition to the lack of planning in all its stages in both the short and the long term, however it is still contributing until now in the provision of animal food products, equivalent to about 52.5 million animal units from the total number of animal units by about 48.43%. In light of the possibility of doubling the forage production for livestock from the same natural pasture area (498 million hectares, which represents more than one-third of the total area of the Arab World), if properly used and then multiply their growth rates, which means increasing their numbers by halting the reasons for the deterioration of land and natural pastures, their development and their environmental management, on the basis of sustainable economic development [4]. The economic and social importance of camels in severe arid areas lies in mind of a symbol of wealth and social excellence in those areas and also a leader uses in social events, in challenges, in heritage and as a main cash income for the survival of these communities. And then, it will be their main supportive in monetary financing for family needs and requirements of daily life and in achieving food requirements of red meat and milk products and therefore it plays a key role in achieving sustainable economic development in those areas under adverse environmental conditions [6]. This, in accordance with the unique physiological standards, that help camels to adapt to these environments. Not to mention the modern uses in light of the application of modern biotechnology techniques such as the use of their fats in creams and skin lotions in addition to their milk in the medical and pharmaceutical uses.

#### **Camel Breeding Systems in the Arab World:**

Breeding and care of the camel systems in the Arab World are characterized by the diversity, despite of the nomad system which was prevalent and the whole system falls under the name of traditional systems. The most important of these systems are as follows [7]:

**Nomadic Bedouin System:** Camels are the primary source of food and cash income in this system, where it is often the system followed by those with large herds that may reach 100 head or more.

**The Semi-nomadic Bedouin System:** Followed by camel breeders who own farms and are practicing agriculture spreads around major cities and moving with their camels with some of their family members for temporary periods during rainfall and severe grazing in arid regions and then return to their permanent homes near their farms, they usually have smaller numbers of camels and camels don't represent the basic income for them and some of them are considering travelling and mobility a type of hobby.

**Settled Bedouin System:** Usually, they are farmers, or owners of factories for olive oils and they have very few numbers of (1-5) heads and these camels are usually raised for milk production, cultivation, transportation, or to work in contemporary olive oils. The traditional breeding systems are the dominant livestock systems in general and they are one of the causes of desertification in the very aridity areas and behind the poor production of camel meat, in particular and especially at the age, which requires us to change the production and breeding of camels patterns and requires us to improve an intensive pastoral production and have to be taken into consideration that in that environment there are grazing animals in the first place and that the concept of condensation in the camel is linked to improving conditions of productivity, because the camels have high fertility under good conditions with the maximum benefit from their distinctive properties for other farm animals in a very arid regions environment. Professor Osman Mahjoub Jaafar at Sultan Qaboos University presented a study about camel breeding under intensive production conditions and the study indicated the presence of payoff and high economic returns to farmers during the application of intensive production of camels [8].

And thus, the reality requires, if not imperative, the addition of a fourth system, which is a pastoral farm system, in order to improve the quantity and quality of the productivity circumstances, with the maximum benefit of their distinctive properties for other farm animals for the purpose of exploiting the environmental conditions and adverse weather in severe aridity areas, in trade and investment in camels and their products, using modern biotechnology applications. Pastoral farm system is used in Egypt on a large scale to prepare the camels coming from Sudan before slaughter or put up for sale in the market and exercised by senior traders working in the trade of camels, but the cost of feeding is high, where it constitutes more than about 70% of the total production

costs [9]. It would search for non-traditional diets using biotechnology applications to reduce the cost of diets in those pastoral farms. As camels are raised in Egypt under the pastoral semi-intensive system, which is the order of prevalence in the natural grassland areas of the north-west coast, the Sinai Peninsula and southern Egypt and under this system of education, camels are suffering of many problems due to the seasonality of the availability of quantity and quality of food and which coincides with the periods of the last stages of pregnancy and milk production, which negatively affects the productivity of camels. So, we can propose the implementation of the semi-intensive pastoral farms in the areas adjacent to the desert in Egypt, in the provinces of Sharqiya, Behaira and Fayoum, where through this system, camels are depending in feeding on natural grassland, in addition to cultivated crop residues in these areas with the use of certain feed and especially the non-traditional. Also through the implementation of semi-intensive culture system using modern biotechnology applications which can improve the nutritional status and productivity of camel meat [10]. In the north-west coast, there are about 5.5 million acres pastures, in addition to about 2.6 million acres in different parts of the Sinai Peninsula. These areas are very low in the pastoral terms, where 50% of them are very bad, 35% in moderate condition and the remaining percentage only about 15% in good condition [11] and this command would need to move towards the Bedouin communities in the development of those areas under the organization and implementation of integrated management programs and the development of pastures and livestock and especially the camels.

**The Objectives of the Establishment of Pastoral Farms [6]:** High fertility camels under good conditions (pastoral farms), because during the years of drought, numbers of camels which does not give birth are increasing, because of the lack of estrus and the fertility rate ranges under natural pasture conditions from 34% to 52%. So, the camel productivity is described as weak in the very aridity areas and may be attributed to the delayed age at first birth, or delayed occurrence of estrus after childbirth or stress or the length of intervals between births or limited breeding season or quantitative or qualitative deficiencies in nutrition and those combined or separate factors cause a decrease in the fertility rate and reproductive efficiency in camels in general [9]. In spite of the optimization description of camels under lack of inputs, the cruelty of nature and environmental pressures and adverse climate of severe drought and intense heat

and sandstorms in living conditions, whether it was individual productivity represented in the increase in live weight and then the amount of meat, milk, durability, leather and wool or productivity, or general productivity represented in the number of camels, as the useful life of the camel may extend to 25 years, during which 6-8 births are given only in extreme environmental conditions, making camels characterized by low reproductive efficiency [12]. So, camels have a promising potential for the production of meat, if possible, set up projects for fattening camels in integration with agricultural production, where camels can achieve an increased grains daily of 1-1.5 kg per day and you may find profitable markets provided to overcome the reluctance of breeders on the sale of small age animals with susceptibility of fattening [13]. Camel meats are distinguished with low fat content and high percentage of water and protein and the estimated rate is by almost 19%, in addition to the many mineral elements and we believe that the camel meat has a great role in reducing heart disease relative to its lack of saturated fatty acid [6]. Pastoral farm is a pattern of land use, either through management and ownership of the state or by the management and ownership of the private sector and can also establish a pastoral farm based on the ownership and the local community or the civil administration, the introduction of modern technologies in the vitality of the animal production and consequent of non-conventional feed processors and the introduction of new types of more valuable food. Pastoral farms for camels can be established in Sudan and thus be a leader country in the adoption of the establishment of the herding farms of camels, where environmental and natural factors encourage this leading experience for the economic assessment and periodic follow-up and then expand the experiment to some countries, especially Somalia and Mauritania. It is supposed to pastoral farms in Sudan to vary between [6]:

- Pastoral camel farms totally dependent on natural pasture for the production of meat and basically assumed to be in the west of Sudan.
- Pastoral camel farms relying on natural grassland and agricultural residues and near the rain and irrigated agricultural and industrial projects (and it is supposed to be at the land of the lining) for the production of meat or milk or perhaps both.
- Pastoral camel farms in intensive system in the vicinity of marginal lands near the major agricultural projects, Al Jazeera, Rahad and New Halfa, principally for milk production.

The main objectives for the establishment of pastoral farms can be limited to the following:

- The ease of control in production quantitatively and qualitatively by means of genetic improvement associated with diet and then, the increase of growth rates because they are slow growing under harsh conditions and not so good specifications and then the possibility of the production of meat amounts of certain rates and specifications of high quality, according to the wishes and tastes of consumers, to follow the innovative systems in breeding camels in those farms and therefore, the productivity of camels can be evaluated under different grazing systems in order to contribute in the increase of achievement of food security of red meat in the Arab World.
- Maximum utilization of natural resources and productivity and in particular the natural pastures and the stability of the production process of milk and meat, in the light of adverse climate and environmental changes and severe food.
- The pastoral farms have major role in the conservation of biodiversity and sustainable use of genetic level of camels and the level of species and ecosystems level, to achieve ecological balance due to the evolution of many ecosystems as a natural result of the interactions with grazing animals, then a lot of other wild species of plants, birds and insects, in light of preserving the wild genetic level of camels [14].
- The possibility of the introduction and use of modern and advanced technologies like artificial insemination and other means and then increase birth rates and the possibility of determining the size of the herd and increase the number of heads that could reach them for more than about 100%.
- The transformation of the pastoral community from the living economy to the productive economy with the aim of internal and external marketing (commercial production integrated with other sectors).
- The creation of social and economic positive gears in the pastoral community and then the economic and social development, through the high prices of camels of pastoral farms compared to traditional systems camels.

**Classification of Camels:** Most of the scientific and economic studies about camel breeding reached that this animal has a promising future in the backbone of the development process in the Arab countries under extreme

climatic changes in the Arab World today and that are waiting in the future, especially if it's possible to export their meat and milk to Arab and non-Arab markets and therefore can open economic prospects of the Arab countries and social prospects for residents of the Arab dry and semi-arid areas, provided that the needs of these vital population have to be taken into account, whether the need of their families or their children in education and health fields in particular [15]. Camels are classified into:

**Production Camels:** they are the most prevalent in the Arab countries and are raised for milk production or meat, because the consumption of camel meat between tribes is rarely except in major events and this is attributed to the reason of dislike it in one hand and the associated with non-proliferation of shops butcher specialized in the sale and on the other hand, the lack of awareness of the importance of health and ways of assorted food uses.

**Race Camels:** They are the camels raised for the ride or race and they are the Omani, Free and Sudanese (missionary) and they are spread in the Arab Gulf States and are distinguished of being authentic descendants of Arab breeds. The majority of these camels are exported to the markets of Arab Peninsula, especially Saudi Arabia and the United Arab Emirates and Qatar. Usually the prices are very high and buyers are armatures of camel racing, where higher prices is a promising indicator to the hybridization of race camels, by using modern biotechnology applications and breeding them as a specialist commercial activity, in order that the sport becomes an attractive industry for those looking for recreation [12]. Whereas, the camel race in Australia has become a pursuant profitable investment, where there are 14 arenas for the race. It appeared recently with competitions of camels, highlighting the special specifications and focusing on beauty standards of camels such as shape, color and age and here, modern biotechnology applications play a vital role in the determination of those specifications and one of the most famous competitions in the kingdom is (mazayin) Competition (King Abdulaziz Award for camels) at Om Roqayba [16].

**The Evolution of the Number of Camels in the Main Producing Countries in the Arab World:** The enumeration of camels in the Arab countries, is more than 15 million head representing nearly 60% of the global total capacity, according to the statistics of Food and Agriculture Organization, of approximately

Table 1: The evolution of the number of camels in the main producing countries of the Arab World per million head during the period (2003-2011).

Years	Somalia	Sudan	Mauritania	Total	The total of the Arab countries	The relative importance of the total of three countries for the Arab countries (%)
2003	7.16	3.50	1.32	11.98	14.47	82.79
2004	7.23	3.72	1.30	12.25	14.80	82.77
2005	7.13	3.91	1.40	12.44	15.06	80.60
2006	7.13	4.08	1.49	12.70	15.42	82.36
2007	7.13	4.24	1.60	12.97	15.72	82.51
2008	7.13	4.41	1.50	13.04	15.91	81.96
2009	7.00	4.65	1.35	13.00	17.12	75.93
2010	7.00	4.62	1.35	12.97	17.26	75.14
2011	7.00	4.72	1.40	13.12	17.36	75.58
Average	7.10	4.21	1.41	12.72	15.90	80.00
%	44.65	26.48	8.87	80.00	100	--

Source: The Arab Organization for Agricultural Development, the Arab Yearbook of Agricultural Statistics, various issues, Khartoum, Sudan, 2014 [21].

Table 2: Estimated functions growth for the evolution of the number of camels for the most important producing countries of the Arab World per million head during the period of (2003-2011).

Statement	Equation	F value	R <sup>2</sup>	The annual growth rate %	Average of annual values of variables
Somalia	$\ln Y = 7.23 - 0.0037 X_1(-4.97) **$	25	0.78	0.37	7.1
Sudan	$\ln Y = 3.46 + 0.038 X_2(13.26) *$	176	0.96	3.8	4.21
Total	$\ln Y = 12.04 + 0.0109 X_4(6.19) **$	38	0.85	1.1	12.71
Total of Arab Countries	$\ln Y = 14.03 + 0.0246 X_5(12.89) **$	166	0.96	2.46	15.90

The number in brackets refers to the calculated value of T. T: Indicates the order of time. \*\* Significant at 0.01 \* Significant at 0.05

Source: Collected and calculated from Table 1.

25 million head, but the irregular distribution where there is almost half of them in Somalia, Sudan, about 28% and then Mauritania of 9.6% [16]. This means that the Arab countries vary in the size of the animal wealth of camels where all of Somalia, Sudan and Mauritania contribute by nearly 80% of the number of camels in the most important countries of the Arab World, during the period of (2003-2011), which averaged about 15.9 million head (Table 1).

**The Evolution of the Number of Camels in the State of Somalia:** Somalia production of breeding camels comes in first place during the period of (2003 - 2011) and contributes with about 45% of the total number of camels in the Arab World. Table 1 realized that the number of camels reached the maximum in the state of Somalia, about 7.23 million head in 2004 and the lowest number has reached about 7.0 million head in recent years, including (2009-2011) and an annual average of about 7.1 million head during the study period, an average of annual decrease was statistically significant about 0.37% of the annual average (Table 2). And this may be attributed to a contraction in the role of the camel under the traditional systems of breeding, who was unable to resist the blows of drought associated with desertification, which led to the shrinking role of the camel economically (milk production – meat production – leather – wool... etc.)

and socially to the extent that we find that many Arabs Somalis don't accept to eat camel meat or drinking their milk, influenced by Western culture [17]. Not to mention the collapse of the livestock economy generally as a result of the high prices of livestock drugs imported, resulting from a decrease in the price of the currency and the emergence of the phenomenon of quasi-veterinarians, which led to the destruction of herds, in addition to the abolition of fees in the European Union on meat and milk products, that would led to the elimination of Africa's pastoral economy concurrent with the transformation of Saudi Arabia for the import of livestock from Somalia at the time of Hajj and the dependence on European markets, in light of the abolition of restrictions on grain markets and reliance on the US surplus of grain, which regularly destroyed peasant and the Somali agriculture and destroyed the pastoral economy [18].

**The Evolution of the Number of Camels from the State of Sudan:** pastoral space available in Sudan is estimated at about 61% of the total space and that about half of the territory is arid and of severe aridity and this is not suitable for livestock farming except camel, in addition to, the periods of drought and desertification have led to large losses in the pasture, which was and is still is a great threat to livestock except camels to the anatomical and physiological characteristics and distinctive

morphological which enable it to production under extreme conditions [6]. Therefore, the production of breeding camels in Sudan comes in second place during the period of (2003 - 2011) and amounted to about 4.21 million head and represents about 26.5% of the total number of camels in the Arab world. Table 1 show that the number of State of Sudan camels reached the maximum number of about 4.72 million head in 2011 and the lowest number has reached about 3.5 million head in 2003. The annual average reached about 4.21 million head during that period. But they are untapped economically for not giving enough attention in the State of development strategies [19]. The foreign trade of the Sudanese camels is confined mainly in the Egyptian market and can be relied upon in the future in the case of increased opportunities to export to Egypt and the Arabian Peninsula, where exports accounted for 3.5% of the total herd of live camels, if the formulation of new policies for the exportation of camels will be possible, instead of the traditional policies used this ratio rises than previously [12]. By calculating the overall trend for the number of camels in the state of Sudan during the previous period, we realized that they were increasing at an annual statistic rate of about 3.8% of the annual average (Table 2).

**The Evolution of the Number of Camels in the State of Mauritania:** Mauritania, is one of the most affected countries by the phenomena of drought and desertification, which led to annual fluctuations in the production of grass, associated with irregular rainfall and associated losses and simultaneous with the weakness of intensive development style and pastoral fodder production, on average, less than 70% of the need of the herd [20]. Therefore, the production of breeding camels in Mauritania comes in third place during the period of (2003-2011) and amounted to about 1.41 million head and represents approximately 8.9% of the total number of camels from the Arab World. Table 1 realized that the numbers of camels in the State of Mauritania reached the maximum number, about 1.6 million head in 2007 and the lowest number has reached about 1.3 million head in 2004 and an annual average of about 1.41 million head during that period. And by calculating the overall trend for the number of camels in the State of Mauritania during the previous period shows that it was growing at an annual increase rate which is not statistically significant.

**The Evolution of the Total Number of Camels From The Main Three Producing Countries of Camels in the Arab World:** Somalia, Sudan and Mauritania are considered of the most important countries specialized in the production of camels in the Arab World with an average production of about 12.72 million head during the study period, which represents about 80% of the number of camels in the Arab World. Table 1 show the number of camels in that countries reached the maximum number of about 13.12 million head in 2011 and the lowest number has reached about 11.98 million head in 2003 and an annual average of about 12.72 million head during that period. By calculating the overall trend for the number of camels in those countries during the previous period shows that it was growing at an annual rate statistically significant increase of about 1.1% of the annual average (Table 2).

**The Evolution of the Total Number of Camels in the Arab World:** Table 1 show the total number of camels, in the Arab world has reached the maximum number of about 17.36 million head in 2011 and the lowest number has reached about 14.47 million head in 2003 and an annual average about 15.9 million head during that period. And by calculating the overall trend for the total number of camels in the Arab World during the previous period shows that it was growing at an annual rate statistically significant increase amounted to about 2.46% of the annual average (Table 2).

**The Evolution of The Relative Importance of the Production of Number of Camels for Most Three Producing Countries of the Total Arab World production:** Table 1 show the relative importance of the production of the top three countries of the total Arab world production during the study period swung upward and decreases, up to a maximum of about 82.79% in 2003 and a minimum of about 75.14% in 2010 and an annual average of about 80%. Consequently, the relative importance of the production of the top three countries of the Arab World total production during the period (2003-2011) decreased from approximately 82.79% in 2003 to about 75.58% in 2011, an average of annual decrease of about (0.90%).

**The Evolution of the Production of Camel Meat of the Main Producing Countries of the Arab World:** The meat is generally important in human nutrition and that due to its high animal protein in the vital value and viability of

almost complete digestion and absorption and then supplies the body with most of the requirements of the amino acids. In addition to that, we find that they contain fat, which provide the body with energy and some of the important fatty acids and minerals such as iron, phosphorus, calcium and vitamins, especially vitamin B complex, in particular, riboflavin and niacin and B12. All eyes now are directed to camels as a good source of cheap animal protein, especially in arid and severe aridity areas that are difficult or almost impossible for the purpose of breeding cows in the production of meat. The camel meat contain a high proportion of glycogen and they are characterized by sweet taste and also it's possible to be used in many industries such as the food industry, mortadella, pastirme, corned beef, sausage and shawerma [22]. Somalia, Sudan and Mauritania are considered of the most important producing countries of camels, but camel meat consumption is rarely among the tribes that are breeding them, only in the major events. Saudi Arabia, Egypt and Libya are considered of the most important consumer countries for camel meat in the Arab World. Camel meat is characterized by its lack of relatively saturated fatty acids, which reduces the risk of heart disease for consumers. And that in addition to the meat of (small camels) until the age of 12 months, with the same quality and characteristics of the meat of bovine calves and lambs. Camels are slaughtered mostly at the age of 4 years for the purpose of consumption of meat. However, it is better to slaughter a camel at the age of 3 years, where the average weight is of about 450 kg and that because it is known that whenever camels increase in age the severity of the meat increase [23]. Camels are producing large quantities of livestock meat, comparing with goats and sheep [22], as the camel is one of the most important red meat sources i many Arab countries to fill the food gap and that may be due because they offer the best

cheap alternative price, especially with diminishing the available forage spaces for Animal wealth and the high cost and water sources, which requires us to be interested by the productivity capabilities of camels, by the rooting of breeds and their specifications and determining the productivity capabilities and ration of quantity and quality of food and the study of the economics of breeding under natural and improved conditions, characterized by sustainable economic management. Table 3 show that the camel meat contributed about more than 36% of the total production of red meat the Arab World in 2011 compared to about 14% during the period of (2003-2011) and this is attributed to the increasing of interest in eating camel meat during 2010 and 2011 respectively at a rate of more than 300% (threefold), which refers to the promising role of camels in bridging the gap of red meat in the Arab World, as well as the role of camel meat in the meat industry at the level of the Arab World, in particular that the camel has great potential for the production of meat in the case of fattening animals, as small pastoral farms system were followed in the Arab camel breeding, using modern biotechnology applications. The increasing demand on eating the camel meat at a rate of 500% (five-fold) during the past two years and the sale and export camel market became pursuant winner in all parts of Australia and camel meat is expected to play an important and mainly role, in the meat industry at the global level [6].

**The Evolution of the Production of Camel Meat from the State of Somalia:** It was shown in Table 3 that the production of camel meat from the State of Somalia have been declining during the period of (2003-2011) and this is attributed to the lack of demand for camel meat internally and ranged between a minimum of about 36.96 thousand tons in 2010 and 2011 and reached a

Table 3: The evolution of the production of camel meat for the most important countries of the Arab World in thousand tons and its importance for the production of red meat done during the period (2003-2011).

Years	Somalia	Sudan	Mauritania	Total (1)	Total of camels meat production in the Arab countries (2)	Total of the production of red meat in the Arab countries(3)	The relative importance of the total of camel meat in the most important 3 countries for the total of red meat (%) (4)	The relative importance for the camels meat of the total of red meat (%) (5)
2003	96.73	84.00	15.30	196.0	324.9	4145.2	60.34	7.84
2004	96.60	88.00	22.0	206.6	329.8	3956.7	62.64	8.34
2005	96.60	61.00	22.0	179.6	291.6	4184.2	61.59	6.97
2006	96.60	101.00	22.0	219.6	320.5	4235.1	68.53	7.57
2007	96.60	106.0	22.0	224.6	328.4	4211.4	68.40	7.80
2008	96.60	113.0	22.0	231.6	344.4	4674.6	67.25	7.37
2009	96.60	119.0	22.0	237.6	442.2	5017.3	53.73	8.81
2010	36.96	504.9	176.1	718.1	1727.8	4843.8	41.56	35.67
2011	36.96	511.9	176.1	725.1	1727.1	4780.3	41.98	36.13
Average	83.36	187.7	55.5	326.5	648.5	4449.8	58.45	14.10
%	12.85	28.94	8.56	50.35	100	--	--	--

1: Total production of the most important three Arab countries, Somalia, Sudan and Mauritania. 4 =  $1/2 * 100$ . 5 =  $2/3 * 100$

Source: Arab Organization for Agricultural Development, the Arab Yearbook of Agricultural Statistics, various issues, Khartoum, 2014 [21].



Table 4: Estimated functions growth for the evolution of the camels meat production for the most important producing countries of the Arab World per thousand tons and its importance for red meat during the period (2003-2011).

Statement	Equation	F value	R2	The annual growth rate %	Average of annual values of variables
Somalia	$\text{Ln } Y = 136.74 - 0.112 X1(-2.79)^*$	8	0.53	- 11.2	83.36
Sudan	$\text{Ln } Y = 42.88 + 0.232 X2(3.86)^{**}$	15	0.68	23.2	187.7
Mauritania	$\text{Ln } Y = 8.83 + 0.267 X3 (2.21)^*$	10	0.59	26.7	55.5
Total of three countries	$\text{Ln } Y = 125.6 + 0.159 X4(3.55)^{**}$	13	0.64	15.9	326.5
Total of camels meat	$\text{Ln } Y = 170.47 + 0.2093 X5(3.37)^{**}$	11	0.62	20.9	648.5
Total of red meat	$\text{Ln } Y = 3869.39 + 0.0273 X6(12.89)^{**}$	25	0.78	2.73	4449.8

The number in brackets refers to the calculated value of T. T: Indicates the order of time. \*\* Significant at 0.01 \* Significant at 0.05.

Source: Collected and calculated from Table 3.

maximum of about 96.73 thousand tons in 2003 and an annual average of about 83.36 thousand tons. Studying the rate of decrease in the production of camel meat from the State of Somalia during the mentioned period, turned out to be amounted to about 11.2% and is statistically significant at the 0.05 level of probability (Table 4). And that despite the fact that the State of Somalia has the largest livestock of camels in the Arab World, where alone it's producing about 45% of the number of Arab camels, compared to only about 13% of the production of camel meat, which requires us to examine the reasons for the challenges and impediments to decrease the number and amount of camel meat in the State of Somalia, to the possibility of achieving development and increase in the numbers and quantities of meat-producing. And at the same time, as methods updated in promoting camel manufactured products, as modern cultures in the manufacture of camel meat and preservation and canning has been introduced for the purpose of increasing the value-added and then to be exported. The assembly techniques and conservation, transportation, manufacturing and packaging of milk, can be entered as is happening now in Saudi Arabia and other Gulf States, as a way of promoting and marketing techniques and here highlights the economic role of the media, through the intervention of the local private and regional sectors in the direction of that so promising investment in Somalia [12]. The need for ministers of the Government of Somalia to take advantage of the possibility of prosperity of camels Commerce to convert a part of them to the source of the necessary resources by marketing camel meat. The ambitions of government officials mustn't be limited to the Arab Gulf States, as their meat has become a favorite meat in the world, due to the presence of the largest herds of camels in the world in Somalia [24].

**The Evolution of the Production of Camel Meat from the State of Sudan:** It becomes clear from Table 3 that the production of camel meat from the State of Sudan is on the rise during the period of (2003-2011) as alternative

commodity to other types of animal farm meat of high price and ranged between a minimum amount of about 61 thousand tons in 2005 and reached a maximum of about 511.9 thousand tons in 2011 and an annual average of about 187.7 thousand tons. The study of the rate of growth in the production of camel meat from the State of Sudan during the period in question clarified that it amounted to about 23 0.2% and is statistically significant at the 0.01 level of probability (Table 4). The production of camel meat in Sudan is occupying the first rank in the Arab countries, although it occupies the next place to the State of Somalia in the evolution of the numbers of camels, which invites us to study this leading experiment, for the possibility of generalization in the rest of the Arab countries. And this may be attributed to the high proportion of the contribution of pasture to about 85% of the food needs of livestock and also to the possibility of expansion in pasture areas to about 67 million hectares [2]. And whereas the general trend in the world actually is directed to low-fat rates of food products (because of the relationship of cationic lipids with heart disease and so on), which would make Sudan assess its potential as essential producer for camel meat and milk, for their advantages and the growing demand on the market because of regional population growth, as in Egypt and the rising of incomes in the Petroleum Gulf countries [12].

**The Evolution of the Production of Camel Meat from the State of Mauritania:** The arid areas in the state of Mauritania is estimated to about 78% of the total area under the irregularity and declining of rainfall, causing the encroachment of the desert to the pastoral areas with droughts relay. The pastoral area is estimated to about 102 million hectares suffering of water scarcity, resulting in disabling large pastoral areas. In Mauritania, there are promising possibilities to establish intensive pastoral farms and semi-intensive, exercising modern breeding patterns [14] as possible, for the confrontation of the problem of water scarcity. About 10.27 million hectares of pastoral land could be converted to agricultural

sustainable uses [21]. And whereas camels are suited to climatic changes because of its genetic, anatomical, physiological and behavioral traits that enable the acclimatization and reproduction and economic production under adverse and changing environmental conditions and what confirms that is what happened in Mauritania in recent years of drought in the natural pasture areas for the lack of rainfall and after a few initial ratio of animal deaths, found that the death of the camel ratio amounted to only about 7%, while in cows it amounted to about 30%. Qandil confirmed that the anatomical, physiological and behavioral characteristics enabled camels to adapt with severe environmental conditions, in light of climate change [2]. Table 3 show that the production of camel meat from the State of Mauritania has been on the rise during the period of (2003-2011) and ranged between a minimum amount of about 15.3 thousand tons in 2003 and reached a maximum of about 176.1 thousand tons in 2010 and 2011 and an annual average of about 55.5 thousand tons and after the study of the rate of growth in the production of camel meat from the State of Mauritania, it was clarified that it amounted to about 26.7% during the mentioned period and it is statistically significant at the level of probability 0.05. (Table 4). And it occupies the third place in the production of meat and Arab camel heads.

**The Evolution of the Total Production of Camel Meat from the Top Three Producing Countries of the Arab World:** As shown in Table 3 Somalia, Sudan and Mauritania, are the largest producers of camel meat in the Arab world with an average production of about 326.5 thousand tons during the study period, which represents more than about 50% of the total amount of camel meat in the Arab World. And it ranged between a minimum in those countries that reached about 179.6 thousand tons and a maximum of about 725.1 thousand tons in 2011. Calculating the general trend of the evolution of the total production of camel meat from the top three producing countries of the Arab world during the previous period, a growing increase was found at an annual statistically significant rate of about 16% of the annual average and is statistically significant at the 0.01 level of probability (Table 4).

**The Evolution of the Total Production of Camel Meat from the Arab World:** As shown in Table 3 that the total production of camel meat from the Arab world has been on the rise during the period of (2003-2011) and ranged between a minimum reached about 291.6 thousand tons in

2005 and reached a maximum of about 1.73 million tons in 2010 and 2011 and an annual average of about 648.5 thousand tons and from the study of the rate of growth in total production of camel meat from the Arab World during the period in question we realized that it amounted to about 20.93% and is statistically significant at the 0.05 level of probability (Table 4).

**The Evolution of the Total Production of Red Meat in the Arab World:** As shown in Table 3 that the total production of red meat from the Arab World has been on the rise during the period of (2003-2011) and ranged between a minimum of about 3.96 million tons in 2004 and reached a maximum of about 5.02 million tons in 2009, with an annual average of about 4.45 million tons and a study of the rate of growth in total red meat production of the Arab World during the mentioned period we realized that it amounted to about 2.73% and it is significant statistically at the 0.01 level of probability (Table 4).

**The Evolution of the Relative Importance of the Production of Camel Meat of the Most Important Three Producing Countries in the Arab World to the Total Production of Red Meat:** Table 3 show that the relative importance of the production of camel meat of the most important three producing countries of the Arab World, for total red meat production during the study period swung upward and decreases, up to a maximum of about 68.53% in 2006 and a minimum of about 41.56% in 2010 and an annual average of about 58.45%. Consequently, the relative importance of the production of camel meat from the 3 most important producing countries of the Arab World for total red meat production during the period (2003-2011) decreased from approximately 60.34% in 2003 to about 41.98% in 2011, with an average of annual shortage rate of approximately (2.3%).

**The Evolution of the Relative Importance of the Production of Camel Meat from the Arab World to the Total Production of Red Meat:** Table 3 show that the relative importance of the production of camel meat from the Arab world to the total production of red meat during the study period swung upward and decreases, up to a maximum of about 36.13% in 2011 and a minimum of about 6.97% in 2005 and an annual average of about 14.1%. Based on the foregoing, the relative importance of the production of camel meat from the Arab world for total red meat production during the period (2003- 2011) has increased from about 7.84% in 2003 to about 36.13% in 2011, with an average annual increase of about (3.54%).

**Obstacles and Challenges Facing the Livestock Development of Camels:**

The Arab Organization returned the decline in the number of camels for the majority of the producing countries in the Arab World to the following most important obstacles and challenges [25]:

- The discovery of oil, where most of the camels' breeders leaved the desert and turned to enjoy this wealth within cities.
- The massive industrial development in the automotive and manufacturing of aircraft and carriers resulted in reducing the importance of camels to transport and trade matter.
- The suffering of natural pastures in the Arab World from degradation problems under the weight of overgrazing and the absence of serious programs for the development and rehabilitation, which effectively limited the productive capacity of these pastures, despite its large area [26]. In light of the weakness of the financial credits programs to manage and improve it, to consider the pastoral development of low priority for the organisms that are preparing and allowing the budgets of States and this is may be due to the fact that the yield of these resources is indirect [6].
- The weak processing pastoral sector in the most important producing countries of camels (Mauritania) to face the opening of markets. In the first place we face the problem of obstacles of the agricultural supply for domestic national and international market and the lack of port and road facilities and finally the lack of human and institutional resources to actively participate in the multilateral system. And this explains the weakness of the country's openness to the international market on the one hand and cautious starting by countries during bilateral regional and multilateral negotiations on the other hand [27].
- The most important economic and social constraints is the spread of literacy level that may hinder the introduction of modernization programs in breeding camels and employ them, making them locked in traditional breeding systems, that are leading constantly to the decline of their numbers in conjunction with weak economic revenue and the absence of Bedouin industries and the lack of public services (roads, sanitation, healthy drinking water, media and communication and health centers and schools, etc.) and non-agricultural property of pastures.
- Limited local market in production countries in general, where the only revenue is coming from the sale. All products of meat, milk, skins and dander and even as a means of traveling and transport, are facing recession and declining demand for the majority of the producing countries, which necessitates those countries to activate the leading role of the local economic media to end the traditional marketing methods that reduce the material interest of the region and the size of producers.
- The spread of diseases associated with the high proportion of deaths as a direct result of the lack of drugs used and their higher prices and the weakness of the veterinary services provided to camel breeders quantitatively and qualitatively and the emergence of semiconductor veterinarians in some Arab countries. That would raise the mortality rate of births and especially until the age of 3 weeks and also the proportion of deaths of embryos. Or may be due to cases of sickness and others caused by the care and breeding methods used, or the wrong intervention of breeders during childbirth or breastfeeding newborn of amounts of milk more than they need, that produced indigestion or diarrhea and early deaths. In general, the mortality rate until the age of two years from the birth of approximately (31% - 59%) [28].
- The lack of knowledge and limitation of information associated with the production and productivity of camels of the most important factors leading to the failure and frustration of those who are interested in the development of camels, or trade and investment functions, as knowledge of basic and applied information relevant to the production capabilities of camels under the prevailing intensive or traditional systems (or semi-intensive) aspiring to in the future, are modest. This is due to the lack of information of quantity and quality of food rations and the efficiency of feed conversion of various types into commodities and the efficiency of reproduction and growth, the features and genetic characteristics of the races of the various camels and, if available, they are discretionary information derived by other non-experimental means unrecognized by scientists, advisers and investors, in the absence of the application of biotechnology capabilities in the field of animal production.
- Researches and special studies about camels in the Arab World are still limited. Centers and related institutions need support and development within

the framework of a strategic plan of clear features including a vision and a clear message and specific objectives and programs and can be implemented on the projects that preceded a special development program and the development of intensive breeding camels in the Arab World, because of its great importance in promoting animal food security of the Arab citizen [29].

- Difficult genetic improvement operations of camels, as most educators are interested in mixing and hybridization processes to take advantage of heterosis in fattening, in addition to the artificial insemination system ineffective until now and in particular specialized in the production countries.
- Decrease in the fertility rate and reproductive efficiency in camels under conditions of natural grassland to about (34% - 52%).
- The direction of the Ministries of Agriculture in the Arab World to import European cows of high production of milk to replace the camel milk in some Arab countries and the establishment of plants for breeding cows, which encouraged camel breeders to increase the unjust slaughter, especially female camels, which led to lower numbers of camels.

**Biotechnology Possibilities in Breeding Camels for the Development of Their Numbers and Their Meat [30, 31]:**

Biotechnology is the latest of applied sciences that revolutionized in overcoming many of the problems of livestock, which requires us to know the fields and their applications in the field of animal production in the sector of camels. Biotechnology: means a collection of modern knowledge and modern technologies and applications that have led to progress in many areas and improving the breeds and genetic superiority and then animal biotechnology can be defined as a set of techniques by which organisms are modified for the benefit of humans and other animals (to improve the breeds). They are genetic modification techniques that draw the genes of lactation milk or give the meat of the sponsor (camels) the owner of these genes and transported to the camels that do not have those qualities or full transferred to the offspring of the next herd and here we find that it is the economic and self-sufficiency of meat and there are two ways to improve livestock breeds of camels:

**The First Through Genetic Improvement by Traditional Methods:** such as the election in animals on the basis of breeding value, especially on the basis of reproductive efficiency and so, the genetic election for fertility is possible to improve, that's why the previous breeding

plans that did not observe the integration of fertility in the breeding of bulls gave positive results. And consequently, we should choose appropriate indicators of fertility in future breeding programs to lead to an increase in fertility.

**The Second Way for Improving the Breeds by Finding Genetic Superiority by Biotechnology Means:**

such as genetic modification technology to create relevant genotypes members, required to form nucleus herds and then the use of other methods of biotechnology, such as artificial insemination, cryopreservation and programs of embryo transfer and cloning, to publish this excellent genotypes. Artificial insemination and embryo transfer and the establishment of banks for sperm and embryos, are considered the ways in which they can access to the rapid progress in the field of productive and reproductive improvement of this wealth (Biotechnology), which is currently characterized by low production and poor reproductive efficiency compared to other animal farm and may be due to delayed puberty or the length of the period between calving or seasonal mating and the non-application and the use of modern techniques like other animal wealth, which received from the research and development that delivers it to this advanced stage and for example what has been discussed and the development of the livestock of cows led to the doubling of the previous production per cow for meat and milk products to more than four times now, in the broadest possible range. If the multiplicity of the number of camels and the productivity of their meat were 300% through medium term development strategy, through the implementation of the following methods:

**First: the Technique of Artificial Insemination:**

The use of artificial insemination allows the deployment of desirable genotypes from a small number of breeding bulls to a large group of camels, which have an impact in the genetic improvement programs for farm animals in general and camels in particular in the world, where artificial insemination allows the production of approximately 100 thousand calves, while the number of calves in the natural pollination does not exceed 100, because the method of artificial insemination allows the deployment of genotype, which carries only the male while the female is not inheriting genetic composition, to about 4-5 born only throughout its productive lives. The results of experiments have shown success in the field of deliveries and the possibility of shortening the interval between births by 40%, from 24 months to 14.5 months [32].

**Second: the Embryo Transfer Technique:** the follow of that way and cultivation in the receiving mothers to produce species carrier for characteristics or new functions and are now used in genetic modification technology in the camels sector. The technologies of spread of transgenic models represent one of the most promising commercial uses of biotechnologies. The production of camels high in meat or milk production is one of the examples of genetically modified animals. In the normal case, camel gives birth to only one camel every two years and give birth throughout her life as not to exceed the 6-8 born in the case of non-application of this technique, in addition to the embryo transfer technology, it has become to the authentic desired camel to give birth to more than twenty camels per year, which is equivalent to threefold what the camel shall bear through the whole period of her life and more. And that is a direct result of thinking in a way to benefit of those large numbers of eggs in the dissemination of the excellent genetic composition with the authentic mother. Abdul Haq Anuasi director of veterinary research center is considering that that embryos implant technology enables the camel to produce several born during one season than what was be produced by all her life, which is saving time on the one hand and on the other hand, it is the most important, cause it can maintain a pure-bred of camel, especially that embryos implant will be done with female camel that proven eligibility in local and international races, as they are sent to the center after becoming ineligible to enter the racetrack again to be subjected to a technique embryos implant to get a larger number of offspring. Anuasi confirmed that there was a female camel during the current breeding season, that received 15 of the males authentic born that realized successes in camel racing and thus get the baby boomers will have certain achievements in camel racing. The Center's efforts succeeded in getting the strain Flyer camel, which is the only camel that was never defeated in camel racing, where nine of which were generated in one year. The birth of a camel technique by transfer and embryo implantation was summarized into the following four stages:

**The First Stage:** by bringing chosen females (and they are excellent genetically females) to take the embryos of them to be sure of the time of monthly period, then female camel will be prepared by hormones in order to prepare more than one vesicle, cause the acceptable rate is eight vesicles, then the examination is done every two days by

radiology ultrasound device that determines the number of eggs and measures the size to determine the appropriate time and optimized to obtain them.

**The Second Stage:** includes the preparation of females (receptors) or incubators of embryos, by giving them hormones in the same day to get on with female fetuses, where incubators are injected by ovulation hormone and thus the receptors female will be at the same time of the menstrual cycle.

**The Third Stage:** to pull the fetus of a female-giving on the seventh day after intercourse with an excellent genetically male, by washing the uterine with fluid to remove all embryos in the uterus and then placed under a microscope for examination and selection suitable embryos for implantation and fetal size is on the seventh day of age and then each embryo is transferred to the womb of the incubator camel after confirmation of the validity and quality of the embryos.

**The Fourth Stage:** the fourth stage is the last one, after ten days of the implantation of embryo to make sure of the pregnancy by ultrasound and if pregnancy confirmed, pregnant female camels are grouped to receive special care until the date of birth, note that there is no effect of incubator camel on the fetus, but at some point it does not interfere with genetic traits at all and in order to the newborn to be a good growth, female camel must be chosen carefully as good growth incubator and abundant milk. This technique allows a greater opportunity for genetic improvement of herds of camels and intensifies breeding lines for the production of milk and meat.

**Third: the Technique to Freezing Embryos:** embryos obtained by the previous method can freeze and used it for a long time and moved from one to another country, which makes flexible education programs much greater than it was before. This method is economically considered the best way to make excellent breeds genetically available to developing countries which do not have the financial ability to get these breeds without embryo transfer method.

**Fourth: the Division of Embryos:** Now, the number of embryos that were obtained from the excellent genetically mothers by the technology embryos split can be doubled and embryos splitting process is collected from the sixth to the eighth day and by surgical microscopic instruments

embryo is bisected into two or four at most in no way affect their vitality, then be planted again in the wombs of surrogate mother to continue the fetal growth and producing quite similar born called matched embryos.

**Fifth: the Cloning of Embryos:** As it is now possible to clone one embryo to eight or sixteen embryo using a technique transfer of the nucleus (and it is the part that carries the genetic composition of the individual) and the way of making this technique can be summarized in the following steps:

- Technical disconnect of embryo cells (consisting of 8 to 64 cells) by microscopic surgical tools for every cell of the embryo to become a separate cell and then remove the nucleus of each cell using a microscopic treatment of embryos.
- Each nucleus is put within the modern fertilized enucleated nuclei in the previous way.
- After that modern fertilization eggs containing nuclei embryonic stem cells are implanted in the wombs of alternative mothers, one or two in every mother will continue to grow to produce genetically identical individuals and thus it becomes possible to copy the genetically excellent animals, which is giving large numbers of these animals genetically matching and have a high capacity in animal production, whether to give meat or milk.

**Sixth: Intensive Production of One Embryo:**

The development of the previous technique where there is a quality of embryo cells are the cells that retain the ability to divide, but they don't differentiate and designate origin cells and are found in the internal mass of cells of the embryo in the early stage of the genetic growth if these cells are taken and placed in an environment and suitable conditions allowing reproducibility, they are providing us with the source of inexhaustible source of nuclei that we use in the cloning of embryos and practically there is no limit to the number of animals that can be obtained by following this technique and this technique is characterized by that all resulting individuals are genetically identical or quite similar and carry the same genetic composition of the fetus, which the originally cells were took from him too.

**Seventh: Physical Cloning:** whereas previous techniques are based on the use of embryos, which consists of the genetic composition of the genotype of the father and mother, resulting individuals carriers are to be installed

together, making the scientists looking for a way to develop these technologies for getting individuals with the same genotype of one individual holding specific genetically complex we want to spread in new members and can be summarized in the following steps:

- Taking nucleus of somatic cell from the animal to be cloned and have been taken from the mother sheep udder that cloned the Dolly sheep after re-programmed, to operate a cell embryonic able to reproduce.
- This nucleus is placed inside the demilitarized modern fertilization egg and enucleated in the same way of the previous technology and make it receives the new nucleus and putting it under the influence of electrical impulses to make a simple chemical changes lead to the beginning of the division.
- This egg bearing the nucleus is implanted in a mother womb to complete the pregnancy and at birth the baby will be a replica of the animal that we take the somatic cell.

**Eighth: the Technology of Pipe Camels:** represented by the birth of newborns through artificial insemination process outside the womb any fertilization in the tube and this technology has many benefits, including: maintaining a certain type of camel when exposed to disease or mortality where they are taking eggs camel that suddenly died, especially If it is an pure expensive camel then fertilizing those eggs inside artificial incubators and thus can maintain this breed purebred camels. From the foregoing it was clear that scientific progress in the field of the use of biotechnology in breeding is making strides day after day in order to reach the shortest time to increase the excellent animals genetically engineered to ensure getting them at the higher productive possibility at the lowest numbers of animals compared to conventional means used in the genetic improvement as genetic selection that needs several decades to reach such a genetically superior animals. It is possible to follow these biotechnologies in the Arab poor countries if they were expensive and need for members of high degree of training, because of the economic returns on the long and average time that compensate this cost, especially in light of experiences capable of giving. The chances of the spread of these modern technologies is increasing the contribution of the private sector in the field of animal production and the spread of commercial farms and large numbers of animals, whether in the area of production of camel milk or meat. From here can be emphasized that the

use of modern biotechnology applications could double the number of camels and the productivity of their meat by 300% through medium term development strategy from 5 to 10 years following the package of development policies for the camels sector whether integrated development rangeland management policies at the severe aridity areas or genetic improvement or health care and veterinary policies for the entire sector or human resources camels sector development policies through a short-term time-branched plans, including development programs that can be implemented on the ground through the integrated development projects in those areas. And thus can fully rely on the camel sector alone and its promising role in solving the problem of red meat on the entire Arab World and especially in light of projected future climate changes.

#### **The Most Important Research Findings:**

- The widening areas of natural pastures in the Arab countries in arid and very arid areas that is unable to have forage resources which cover the actual needs of livestock wealth, which led to the decrease of animal production of milk and meat and to lower the low growth rates and also lower genital efficiency.
- Camel pastoral farming sector is linked to complicated social and economic systems that has to be known and be familiar with before the development of programs for the development and the evolution of this traditional important sector and those systems include herds structures and sizes, by sex, age and education systems and take care of camels and seasonal nomadic and the role of family in the care of camels and camel breeding integration with other animals and the role of the camel in the social and economic life of the breeders and the most important problems facing them. And then, the need to conduct research scanner studies to identify the challenges and constraints of each State separately and the possibility of establishing pastoral farms under the identification of funding sources and their economic feasibility and of trade and investment, particularly from the affluent and deficit countries in the production of red meat.
- Camels are a good source of milk and meat, especially in arid and severe aridity regions where negative of environmental and weather changes are adversely affected the performance of other farm animals.
- Traditional breeding systems for grazing camels prevailing in arid and severe aridity areas behind the poor production of meat and at the same time, led to the instability of nomadic pastoralists and have taken away the access to basic services such as education, health and clean water, as well as social isolation and seclusion in a limited customs and culture place which negatively affects the culture and at the same time weaken the personal abilities to promote the development of camels in those traditional systems that could realize economics sufficiency ignoring market economics, in the absence of all the planning stages in the short and long term.
- The decline in the number of camels and meat for the most productive Arab countries such as (Somalia) and that as a result of changes in social habits and consumption patterns of the Somali nomads in conjunction with the environmental and climate changes, associated with the drought, at the same time of the interest in camels in the Arab World in general and in the races in some Arab and other global countries in particular, as a profitable investment.
- Camels are important sources in Arab countries to fill the food gap of red meat, which contributed about 36% of total production in 2011 compared to about 14% during the period of (2003-2011) and this may be due to increasing the interest in eating camel meat during 2010 and 2011, respectively, which indicates a promising role of the camel in the red meat fill a gap in the Arab World using modern biotechnology applications.
- The use of modern biotechnology applications could double the number of camels and the productivity of their meat by 300% through development strategy of medium term from 5 to 10 years, following the package of development policies for the camels sector, whether integrated development rangeland management policies in the severe aridity areas or genetic improvement or health and veterinary care policies for the entire sector or human resources policies or the camels sector development policies, through a short-term plans, including development programs that can be implemented on the ground through the integrated development projects in those areas. Thus, it can be fully rely only on the camels sector and its promising role in solving the problem of red meat on the entire Arab World and especially in light of projected future climate changes.

### **Recommendations:**

- Reconsidering the whole pastoral camels sector, by the optimized exploitation for this animal supplier (camels), improving and developing the production which is characterized by low production capacity that can be developed and improved and utilized in the production of meat and milk by changing the patterns of production and breeding of camels from traditional systems to intensive pastoral production using modern biotechnology applications.
- The need to establish a market for Arabic camels inside any Arab country where the services and feed are available, they are given by the camels from all over the Arab countries and come to importers to buy their needs and complement their actions and then migrated to the importing countries, which strengthens the position of the exporter, who is not forced to sell his animals at any price, as is the case in the relationship between the states of Sudan and Egypt have been attributed to the limited choices [12].
- Improving the breeds by the election and the need to keep producing and developing animals under the disposal of the poor and the sick and the old non-productive and in conjunction with the development of new economic types superior in productivity of the current species in milk and meat production and the resistance of thirst and diseases and the quality of metabolism.
- Conduct studies on the reality of the production and marketing of meat and camel milk in the Arab region, to develop the production of camel milk and meat and marketing to increase the income of small breeders and then activate internal and regional trade for camel's products in the deficit countries.
- Promoting the integrated development projects of camels in arid and severe aridity areas of the Arab World to create a suitable investment climate to attract investors and involve the private sector as a main pillar in the development of trade climate and investment for livestock and especially camels, along with attracting foreign investors and in particular the investment in camels and their products under environmental conditions and adverse climate and the current global economic situation.
- The preparation of a private development and the development of intensive breeding camels programs in those areas at the level of the main producing countries of camels in the Arab World and in particular the state of Sudan.
- Studying the genetic map of local breeds in order to maintain and develop.
- Taking advantage of camel meat of a minimum and large age and grades in order to raise the nutritional value by adding the necessary production inputs for manufactured in various forms such as sausage, Berger, kofta, dryer, chopped... etc. and supplied to domestic consumers at affordable prices in producing countries by taking advantage of scientific research in the field of production and meat processing techniques.
- Modern breeding techniques is one of the means that can be applied to meet the increase of livestock production to meet the availability of red meat from artificial insemination, freezing semen, maturation and inoculated eggs outside the womb, embryo transfer, cloning.... etc.
- Encouraging industrial, commercial and productivity projects based on camel products and in particular the establishment of specialized industrial zone in leather manufacturing to help bring in investments and technologies and accumulate tanneries and skin industries in one place for the Arab States and will contribute in overcoming many obstacles and protects the environment and achieve sustainable development and creates employment opportunities.
- The management and improvement of natural pastures planting with fodder shrubs resistant to drought and salinity as an alternative to conventional feed in the pastoral severe aridity land using saline water for the cultivation of fodder shrubs that cultivation is suitable in high land salinity and low fertility and near the shores of the sea or groundwater wells in order to evaluate the feeding camels and the impact on the productivity and quality of their meat, especially pastures of the northwest coast of Egypt. In conjunction with the infrastructure care of environments of camel breeding and taking into account the drinking points that would help to alleviate the load of pasture as well as to facilitate the task of veterinarians to visit the herd when needed, with the provision of educational services, health, clean water to drink, across camels paths.

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