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Formulation and Evaluation of Donkey Milk (Energy Drink)

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Abstract: ***Milk is one of the most common causes of food allergies among children under one year of age. No specific therapy exists for this allergy, and thus the only feasible response is to avoid assumption of milk and derived products. Studies conducted on the serum of children with hypersensi-tivity to milk have shown that caseins are the proteins with the greater allergenic potential. However, in some cases, children have also shown hypersensitivity to the β-lactoglobulines and to the α-lactal- bumins. When food intolerance is diagnosed in an infant, it is often necessary to impose a period of total parenteral feeding, followed by breast feeding, considered the most correct method of re-feeding. When human milk can not be given, alternative food sources must be sought. Clinical studies have demonstrated that donkey milk could substitute breast feeding in infants affected by severe Ig-E me- diated milk allergies. In these subjects, donkey milk is not only useful, but also safer than other types of milk. In fact donkey milk composition in lipids (high levels of linoleic and linolenic acid) and pro-teins (low caseins content) is very close to human milk. Lysozyme content in donkey milk resulted to be very high (mean value 1.0 mg/ml) if compared to bovine (traces), caprine (traces) and human milk. The high lysozyme content of donkey milk may be responsible of the low bacterial count reported in literature and also makes this milk suitable to prevent intestine infections to infants. Among seropro-teins, β-lactoglobulin and α-lactalbumin content in donkey milk was respectively 3.75 and 1.80 mg/ml and remained substancially the same during the different stages of lactation.***

Keywords: ***Donkey milk, Milk quality, Milk chemical compositions, antibacterial activity, bioactivity, health benefits , therapeutic.***

I. INTRODUCTION

Donkey milk Provides essential nutrients and plays a Significant role in both healthy as well In diseased Condition.milk form an Integral part of human diet.certain individuals suffering from milk allergy caused by milk from bovine source seek milk from non-bovine donekey is closest to human milk and shears to lots of nuttritional quality.It also possesses higher amount of anti imflametery omega-3 fatty acids compared to Cowes milk .the donkey Equus Africanusasinus , is a domesticated member of the Equida family. the domestication of the donkey begans about 600

BC in present day libya starting from one or two subspecies of African wild asses. donkey milk has higher amount of whey proteins and essential amino acids as compared to bovine milk. donkey milk has anti-microbial , hypo- allergic and antI- anging properties.donkeys have a lifespan 30-50 years and have a historically been used for riding ,as a pack animal for a short-distance transport , and as a draft animal.other use include milk production (used in human nutrition and in cosmetic industry), meat production (very limited in some countries), onotherapy (a method of using contact and educational technique with donkey's to help people with chalanges), and finally for reactional purpose such as riding and ecotourism.



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II. MATERIALS AND METHODS

A. *The Source And Collectionof Sample*

The donkey milk came from 20 heads and 38 ± 4 month old donkeys in Tianjin LongTian breeding company. Firstly, the milking system was cleaned in 40 °C water. Then, the nipple was cleaned gently and quickly, and stimulated in the order of elution, medicated bath, dry and massage. At last milking was proceeded. The milking was divided into pre-milking and milking. The operation of pre-milking was to observe and touch the breast whether there were the symptoms of red, swelling, fever, pain, trauma and so on before milking. Milking was used the "S" type cups method. The cups were set on nipples and the action was quick and accurate to avoid air entry to the milking system. It was ensured that 200 mL milk was kept in breast after milking. The milk was processed as donkey milk powder by the Zhongke Yun Health .

B. *Chemical Composition of Donkey Milk*

1) Proteins
2) Amino acids
3) Fat and fatty acids
4) Lactose
5) Vitamins
6) Minerals and trace elements

C. *Proteins*

1) Good for human bones
2) Helps maintain weight loss
3) Reduces appetite and hunger level
4) Increases muscle mass and strength
5) Lowers blodd pressure
6) Boosts metabolism and increase fat burning
7) Fuel energy and carry oxygen throughout body in blood

D. *Nutritional Composition and pH Values in Different Milk Types*

Sr.No	Componentsg/100g	Donkey	Bovine	Human
1	Total solids	8.8-11.7	12.5-13	11.7-12.
2	Fat	0.3-1.8	3.5-3.9	3.5-4.0
3	lactose	5.8-7.4	4.4-4.9	6.3-7.0
4	Ash	0.3-0.5	0.7-0.8	0.2-0.3
5	Total protien	1.5-1.8	3.1-3.8	0.9-1.7
6	Casein	0.64-1.03	2.46-2.80	0.32-0.42
7	Whey protein	0.49-0.80	0.55-0.70	0.68- 0.83
8	PH	7.0-7.2	6.6-6.8	7.0-7.5

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E. Amino Acids

1) Providing extra energy for human body
2) Helps to normal digestion
3) Healing and repair
4) Assisting and maintaining musle tone tissue strength
5) Assisting in the creation and growth of muscles, connectiv tissue and skin.
6) Producing neurotransmitter
7) Maintaining healthy skin , hair and nails
8) Regulating moods by helping produce hormones

F. List of Amino Acids

1) Essential = histidine, isoleucine , leucine, lysine, methionine, phenylalanine, threonin, typtoohan, valine
2) Non essential = alanine, asparagine, aspartic acid, glutamic acid
3) Conditional= arginine, cysteine, glutamine, tyrosine, glycine, ornithine, proline, serine

G. Lactoselactose

The lactose content of donkey milk range from 6 to 7 % and is higher than that of cow milk (4.1 to 4.4%).the high lactos content promotes the osteogenesis process, facilities the intestinal absorption of calcium and phosphorus and influences the mineral accumulation in bone structure, which help in the prevention of osteoporosis .in addition to this , lactose is also responsible for the good taste of donke milk.

H. Vitamins

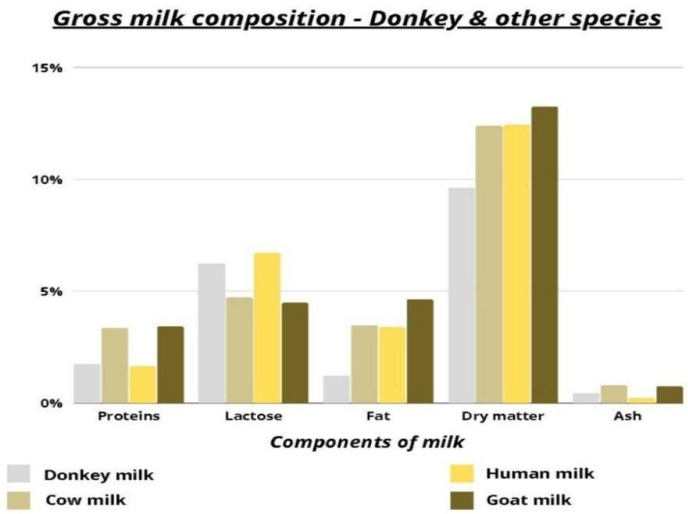
Milk can be considered as an almost complete food for newborns, since it contain the recommended amount of essential nutrients ; it's whey fraction is a great source of water soluble vitamins. Additionally , fat soluble vitamins are present in its lipid fraction.the total vitamin content of milk varies depending on the mother diet . The contents of vitamins present in Donkey milk makes it an excellent nutrional food with a beneficial effect on human nutrition and health.

I. Vitamin Content of Different Milk Types

Sr.No.	Vitamins (mg/L)	Donkey	Bovine	Human
1	Vitamin A	0.017	0.32-0.50	0.3-0.7
2	Vitamin E	0.050	0.92-1.28	3.8
3	Vitamin C	3.5-5.0	0.94	50-100
4	Vitamin B1	0.41	0.37	0.0003- 0.015
5	Vitamin B2	0.64	1.8	0.4-0.6
6	Vitamin B3	0.74	0.9	1.7
7	Vitamin B12	1.10	0.0004	0.5

J. Minerals and Trace Elements

The importance of minerals in human nutrition is well known, because they play a fundamental role in growth and skeletal structure development. The mineral and trace element composition of donkey milk is very close to that of human except that donkemilk has higher levels of calcium and phosphorus, but the Ca-P ratio is similar. Regarding essential trace elements, donkey milk contains similar concentrations of Zn, Co, and I, with human milk, whereas Fe, Cu, and Se concentrations are lower. The milk produced in the first month of lactation, when it is the only nutritional source for the foal, contained the highest levels of mineral elements, which may be related to the fast growth stage of the foal. During the lactation, there is a significant decrease in the composition of minerals in milk, which could be explained by the concomitant decline of casein amount since those minerals are mainly associated to the casein micelles.



III. ROLE INGREDIENTS USED IN FORMULATION

A. Cashewe

1) Cashewes are low in sugar and rich in fibre, heart healthy fats, and plant protein .

2) They're also a good source of copper, magnesium, and maganese nutrients important for energy production , brain health, immunity,and bone health.



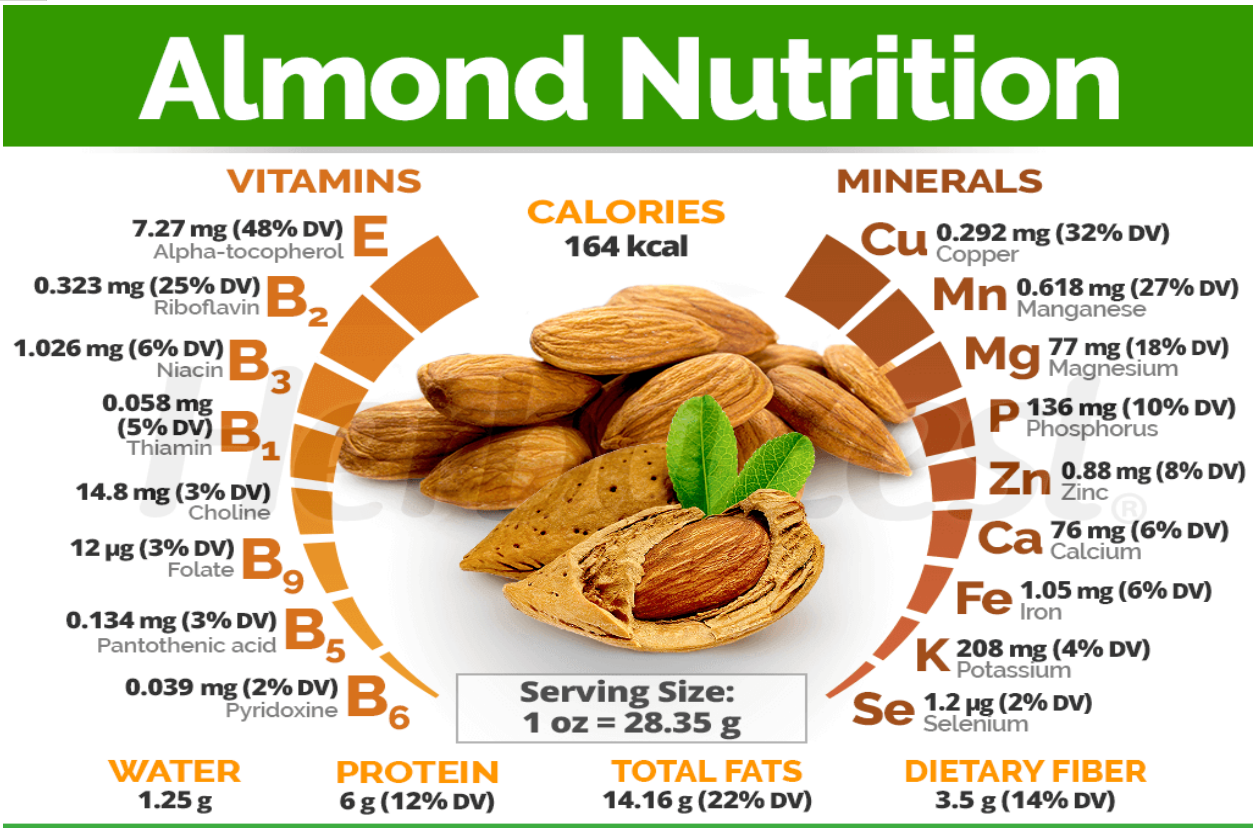
Benifits of cashews

a) Cashews are the type of nut with a soft consistency and sweet flavour.
b) They are native to South America Specifically Brazil and we're introduced by colonists to Africa and india.
c) These regions are the largest producers of cashewes.
d) Cashewes are sold both raw or roasted , and salted or unsalted.
e) According to us department of agriculture(USDA) of raw cashews contain :
f) 157 calories
g) 8.56 grams(g) carbohydrates
h) 1.68 g of sugar
i) 0.9 g of fiber
j) 5.17 g of protein
k) 12.43 g of total fat
l) 10 milligrams(mg) of calcium
m) 1.89 mg of iron
n) 83 mg of magnesium
o) 168 mg of phosphorus
p) 3 mg of sodium



B. Benefits Of Almond

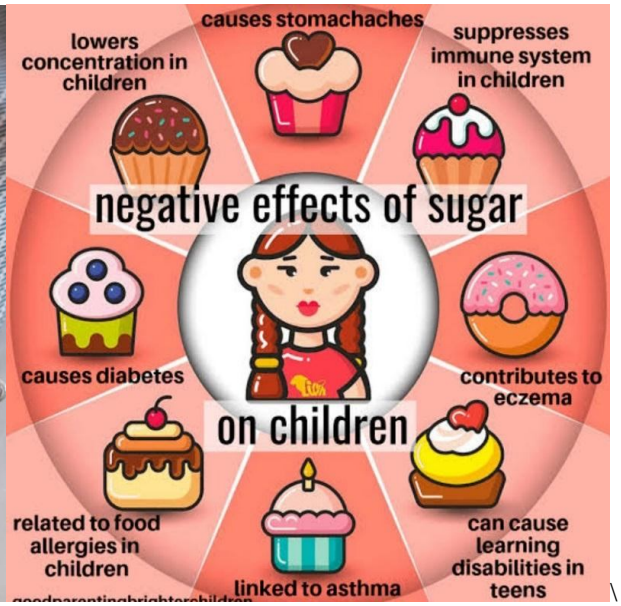
1) It protects against heart disease
2) For healthy muscle
3) For fighting diabetes
4) Regulates the body temperature
5) Helps in Oxygen movement
6) Fight against chronic disease
7) Fights against cataracts and cancer



C. Sugar powered

1) Higher energy lavel
2) A stronger immune system
3) A better sleep
4) Improved gut health
5) Weight loss





D. Cocoa Powder

Dry cocoa solids are the components of cocoa beans remaining after coca butter ,the fat components, is extracted from chocolate liquor, roasted cocoa beans that have been ground into a liquid state. Cocoa butter is 50%- 57% of the weight of cocoa beans and gives choclate it's characteristics melting properties. Cocoa powder is the powered form of the solids sold as an end product.

1) Types of cocoa mass:

2) Cocoa mass may be used for the production of:

Chocolate or for pressing i.e production of cocoa butter and cocoa powder.cocoa powered is either alkalized or non alkalized.alkalized cocoa powder contains pottasium carbonate, sodium carbonate sodium hydroxide, magnesium all of wich nutralizes the naturally accuring acids and make the Powder easier to dissolve in milk .cocoa powder may also contain added starch (i.e corn starch) to keep it free from caking during storage unsweetened cocoa powder is yes primarily in baking.sweetened cocoa powder is offten mixed with milk or water product



3) Introduction of Cocoa

a) Cocoa is thought to have first been used by the maya civilization of central America.

b) It was introduced to Europe by spanish conquerors in the 16th century and quickly became popular as a health promoting medicin.

c) Cocoa powder is made by crushing cocoa beans and removing the fat or cocoa butter

d) Today, cocoa is most famous for its role in chocolate production .however , modern research has relevated that it dose indeed contain Important compounds that can be benifit your health.



4) Quality Criteria for Cocoa Mass

Sr.No	PARAMETERS	VALUE
1	Fat	50-58
2	Moisture	max. 2.50
3	PH	5.2-6.0
4	Shell content, % max.	1.75
5	Total bacteria	max.10000/g
6	Moulds	Max.50/g
7	Yeasts	Max.50/g
8	Entereobacteria/g	negative
9	E.coli/g	negative
10	Salmonella/25g	negative

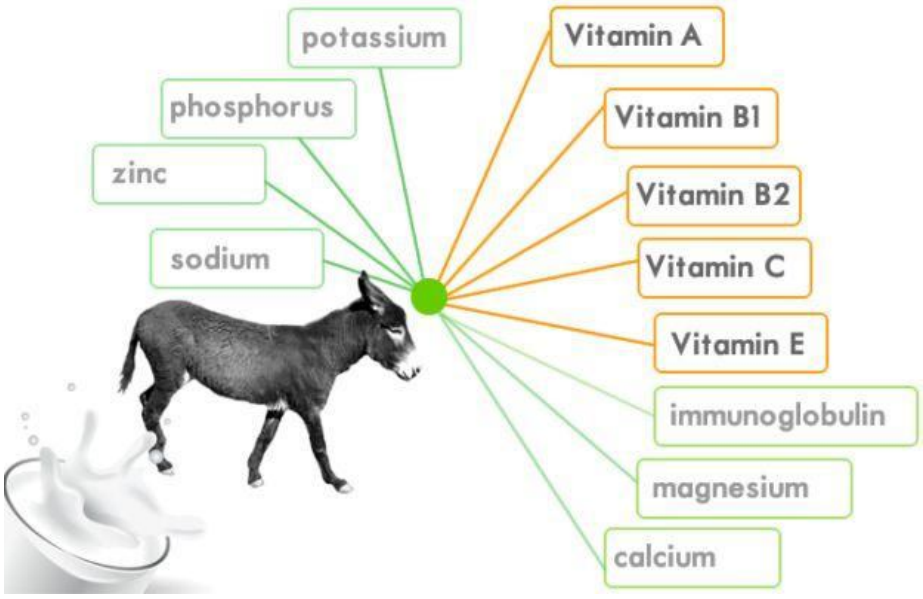


5) Quantity of ingredients used in energy milk (Donkey milk)

Sr.No.	Ingredients	quantity(gm)
1	cashews	4
2	Almond	5
3	Sugar powered	4.3
4	Cocoa powder	10

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IV. EVOLUTION OF DONKEY MILK

A. The Lactometer Test

Addition of water to milk can be a big problem where we have unfaithful farm workers, milk transporters and greedy milk hawkers. A few farmers may also fall victim of this illegal practice. Any buyer of milk should therefore assure himself/herself that the milk he/she purchases is wholesome and has not been adulterated. Milk has a specific gravity. When its adultered with water or other materials are added or both misdeeds are committed, the density of milk change from its normal value to abnormal. The lactometer test is designed to detect the change in density of such adulterated milk. Carried out together with the Gerber butterfat test, it enables the milk processor to calculate the milk total solids (% TS) and solids not fat (SNF). In normal milk SNF should not be below 8.5% according to Kenya Standards(KBS No 05-l0:-1976)

Example: Calibration temperature of lactometer 20ºC.

Sr.No.	Milk Temperature	Lactometer reading	True reading
1	17 ºC	30.6 ºL	30.0 ºL
2	20 ºC	30.0 ºL	30.0 ºL
3	23 ºC	29.4 ºL	30.0 ºL

B. The Alcohol-Alizarin Test

The procedure for carrying out the test is the same as for alcohol test but this test is more informative. Alizarin is a colour indicator changing colour according to the acidity. The Alcohol Alizarin solution can be bought ready made or be prepared by adding 0.4 grammes alizarin powder to 1 litre of 61% alcohol solution.

C. Acidity Test

Bacteria that normally develop in raw milk produce more or less of lactic acid. In the acidity test the acid is neutralised with 0.1 N Sodium hydroxide and the amount of alkaline is measured. From this, the percentage of lactic acid can be calculated. Fresh milk contains in this test also "natural acidity" which is due to the natural ability to resist pH changes .The natural acidity of milk is 0.16 -0.18%. Figures higher than this signifies developed acidity due to the action of bacteria on milk sugar.

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D. The Gerber Butterfat Test

The fat content of milk and cream is the most important single factor in determining the price to be paid for milk supplied by farmers in many countries. Also, in order to calculate the correct amount of feed ration for high yielding dairy cows, it is important to know the butterfat percentage as well as well as the yield of the milk produced. Further more the butterfat percentage in the milk of individual animals must be known in many breeding programmes. Butterfat tests are also done on milk and milk products in order to make accurate adjustments of the butterfat percentage in standardised milk and milk products.

E. Inhibitor Test

Milk collected from producers may contain drugs and/or pesticides residues. These when present in significant amounts in milk may inhibit the growth of lactic acid bacteria used in the manufacture of fermented milk such as Mala, cheese and Yoghurt, besides being a health hazard. Principle of the method: The suspected milk sample is subjected to a fermentation test with starter culture and the acidity checked after three (3) hours. The values of the titratable acidity obtained is compared with titratable acidity of a similarly treated sample which is free from any inhibitory substances.

F. Clot on Boiling (C.O.B) Test

The test is quick and simple. It is one of the old tests for too acid milk(pH<5.8) or abnormal milk (e.g. colostral or mastitis milk). If a milk sample fails in the test, the milk must contain many acid or rennet producing microrganisms or the milk has an abnormal high percentage of proteins like colostral milk. Such milk cannot stand the heat treatment in milk processing and must therefore be rejected.

V. THERMAL TREATMENT

Donkey milk's availability, as already discussed, is rather limited, and, therefore, preservation for extending storage is of great importance. At the moment, donkey milk is available in the market as nonprocessed (raw) and heat treated (i.e., pasteurized and ultrahigh temperature (UHT)). Additionally, donkey milk has been stored in other forms (i.e., frozen, freeze-dried (lyophilized), and powdered). Donkey milk is mainly consumed for its health-related benefits; hence, the effect that processing has on the valuable components should be assessed. Polidori and Vincenzetti(82) studied the effect of thermal treatments on the protein fraction of donkey milk, reporting that raw and freeze-dried milk had comparable quality characteristics (i.e., lysozyme and vitamin C contents). Lysozyme was active even after powdering or freezing donkey milk, while vitamin C content overall decreased during frozen storage for 3 months. Thermal treatments of donkey milk at 63 °C/30min and 72 °C/15s did not significantly affect the immunoglobulin content (IgA, IgG) when compared to raw milk (unpublished data, Papademas). Further to the above-mentioned changes occurring in donkey milk constituents, thermal treatment increased furosine formation during milk powder production, while α-tocopherol content was decreased by 41% when donkey milk was heated to 90 °C/1 min.(22) Vitamin C is also partially damaged during milk powder production.(20) Additionally, lipid peroxidation of unsaturated fatty acids of donkey milk is of concern when technologies and processes for extending donkey milk shelf-life are applied.(22) Moreover, Salimei and Fantuz(20) discuss the effect of heat treatment on lysine content of powdered horse milk, which was found to be lower than raw or freeze-dried milk.

VI. LABELLEING AND RECORDS

Samples must be clearly labelled with name of farmer or code number and records of dates, and places included in standard data sheets. Good records must be kept neat and in a dry place. It is desirable that milk producers should see their milk being tested, and the records should be made available to them if they so require.

Final Product



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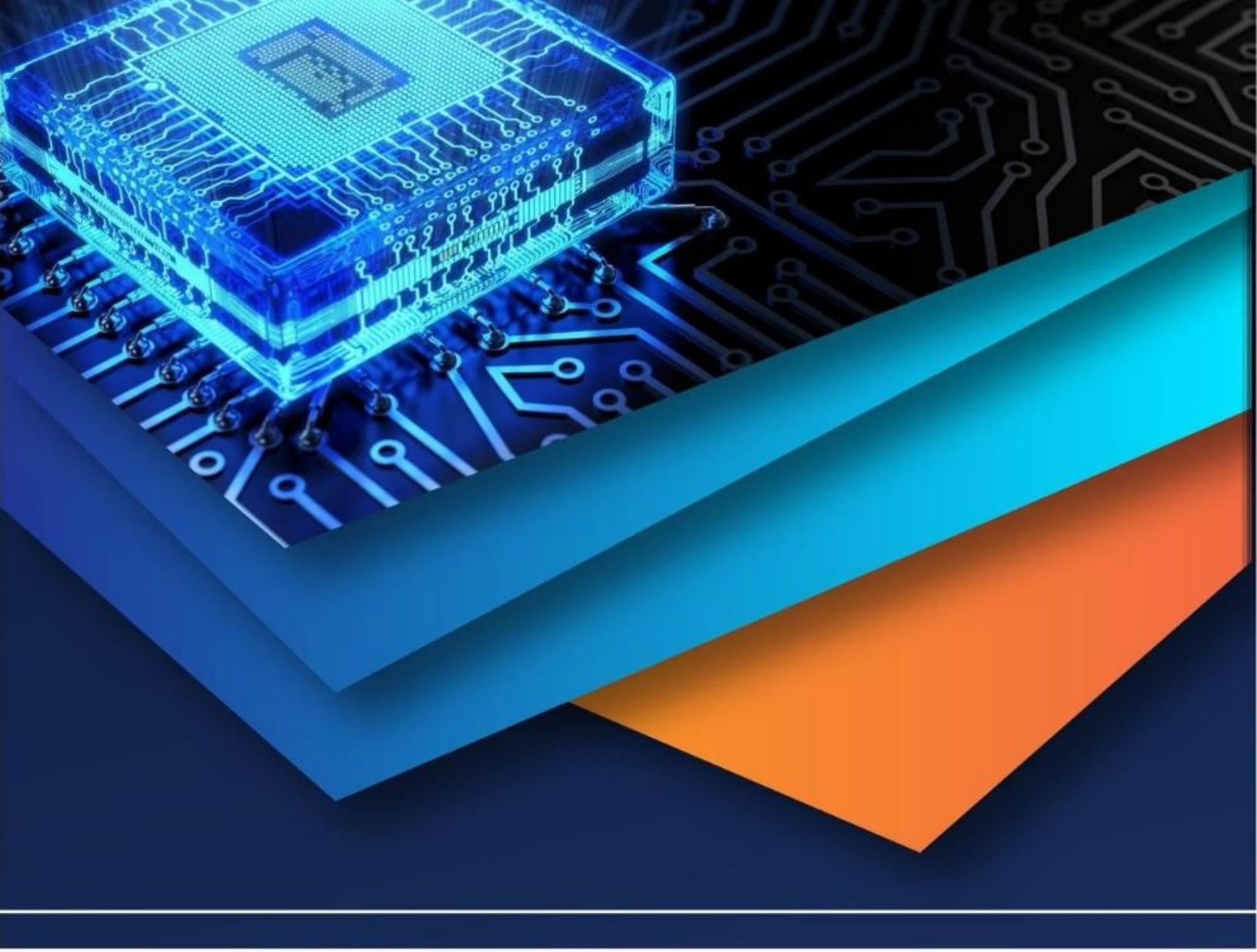
VII. RESULT AND CONCLUSION

Donkey milk has become more and more attractive nowadays as a commercial product because of its nutritional values and functional properties . Studies have shown that donkey milk is a kind of effective adjuvant for allergy of milk protein and a variety of food intolerant patients . Donkey milk can be used as a supplementary of human milk, and is the lucky star for infants who are a lack of human milk, especially for those who have allergic reaction of protein when drinking cow milk . So the development of donkey milk as a basic material for infant milk powder or food will inevitably become a trend. We have successfully gained the high quality donkey milk powder.

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