

Comparing models of artificial neural network and the model ARIMA for predicting price of veal in Iran

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Abstract

In this study we investigated model of artificial neural network compared to the model ARIMA for predicting price of wholesale of veal. Then data needed for period March, 2002 to July 2013 were gathered from department of animal and agricultural organization support of Iran. The study results indicate that model of artificial neural network can predict price of wholesale of veal with an error less than the model ARIMA and it has higher level of accuracy.

Keywords: price, artificial neural network, ARIMA

INTRODUCTION

Iran's livestock industry devoted 27 percent of its value added of agricultural sector to itself, hence it has a special place in economic major of agricultural sector. The industry mentioned provides over 50 percent of protein used in Iran and it is used a lot in Iranian family. Average annual consumption of meat in developed countries is 26/7 kilograms and it is 6/4 kilograms in developing countries. While the value expressed in Iran is equal to 11/3 kilograms [5]. Also according to production feature in agricultural and livestock sectors where there is a pause (gap) between decision-making for production to being applicable, predicting price has always been interest of producers and consumers [3].

Auto-regressive models (AR) were first introduced by Yul in 1929. Then Staltsgi completed these models in 1938 by introducing mean animation (MA) models. In 1938 Veled introduced models of ARMA by combining auto-regressive and mean animation. He showed that that these models can be applied for a wide range of static time series. Finally, in 1978 introducing the model ARIMA, Box Jenkins presented a completed version which these days is applied in many various predictions [10].

Today, predicting events is noticed by researchers in different fields and various methods on this have been invented as well. One of the latest prediction methods is artificial neural network approach (ANN). On this field, too much study has been conducted in and out of Iran some of which are as follows:

Using criteria of assessing models efficiency in a study in 2008, Fahimy Fard compared efficiency of ANN models and auto-regressive in predicting retail price of agricultural products of Iran. His studies showed that artificial network model in all time horizons investigated, has more efficiency compared to models of ARIMA and GARCH. In a study in 2007 Haloufi et al dealt with short-term prediction of food price in China using three models of MSOA, BP and ARIMA.

Their study showed that propagation algorithm faces some problems such as weak and gradual convergence. Therefore, they suggested a multistep optimum approach (MSOA) in order to overcome weakness of BP. They realized that predictions of the model MSOA is significantly more accurate than the models BP and ARIMA.

Cases and methods:

Process of the model ARIMA:

Conducting a prediction includes probable distribution inference of a future observation about society, providing that a sample (like Z) is clear from past values. To do this, we need ways of describing random processes and time series. We also need a series of random models which must have the skill of describing condition which happen in practice. A key series of random process are static processes. Certain static random process which have values from aspect of determining time series model include auto-regressive process, mean animation and processes of mixed auto-regressive mean animation[7]

The model ARIMA is in fact summarized form of vector models and in spite of having sufficient data, it can predict time series as well as vector models.

The model ARIMA or Box and Jenkins methodology include four following steps:

1. Step of test recognition or identification: if time series are static after d is first-time difference times and if we model if by the process ARMA(p,q), then main time series will be ARIMA(p,d,q). In this step we try to determine real value of p,d,q, and to do this we use tools of correlation coefficient. If r_k is drawn against k(pauses), the chart gained will be correlation chart of time series.

The sample correlation (SAC) itself with pause k includes:

$$r_k = \frac{\sum_{t=1}^{n-k} (x_t - \bar{x})(x_{t+k} - \bar{x})}{\sum_{t=1}^{n-k} (x_t - \bar{x})^2} \quad (1)$$

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In this formula:

r_{kk} : is auto-correlation coefficient, z: is static time series from b times, b: number of steps in difference for static time series, k: number of pauses and n: number of observations.

Minor auto-correlation of the sample (SPAC) with pause k includes:

$$r_{kk} = \frac{r_k - \sum_{j=1}^{k-1} r_j r_{k-j}}{1 - \sum_{j=1}^{k-1} r_j r_{k-j}} \quad (2)$$

In this formula:

r_{kk} : minor auto-regressive coefficient

1-Each of stochastic processes show a certain pattern of SAC and SPAC and according to status of the pattern under investigation (falling view, falling Sinus wave or mixture of both) and pauses of SAC and SPAC which have of point, so we can recognize process of time series[6]. Also we can determine number of total auto-regressive and number of sentences in mean animation by criteria and statistics.

Akaike information criterion (AIC) And Schwarz Bayesian criterion (SBC) which should have the least value [11].

2-Estimation step: after step of recognizing, we deal with estimating model parameters. To estimate we will use ordinary least squares (OLS).

3-Recognition control: in this step, conducting static test on remaining of the model ARIMA, the model will be controlled from aspect of good fit. If remaining is white noise disturbance, the model selected will be accepted, otherwise the model will be rejected and previous steps will be repeated.

4-Prediction: in this step, using the final model gained we will deal with short-term prediction of time series. In many cases predictions gained from the model ARIMA are for short-term and they are reliable more than econometrics traditional modeling methods.[1].

Model of artificial neural network:

Artificial networks are of the most dynamic research fields in contemporary time and they attracted many people from different scientific majors. Biologists studied biological neural networks in many years in which human brain is an example of these networks. Achieving brain function has been a non-stopped effort which was started more than 2000 years ago by Aristotle and Herakleitos. It continued with researches of other scientists such as Ramny Kajal, Kolgi and Heb.[9].

An artificial neural network is formed of many neurons which connects nodes to each other. Neurons which are in input layer, are called sensing neurons and neurons of output layer are called responding neurons.

Hidden neurons are located between input and output neurons. Information enter network through input neurons, then they are connected to hidden layer through connections and finally network output is gained from neurons of output layer. These steps are similar to biological neural network of men.[2].

Multi-layered perceptron networks MLP:

The aim of artificial neural networks is trying to make some patterns which can act like human brain. Function of artificial network creates an output pattern based on input pattern presented to network. Neural network includes some

processing elements (artificial neurons) and these neurons receive outputs and then process, finally present an output out of it. Input can be raw data or input of other processing elements. Output can be final production or output for another neuron. An artificial neural network includes artificial neurons which are in fact processing elements. In the following picture a processing elements is explained in a simple form [2].

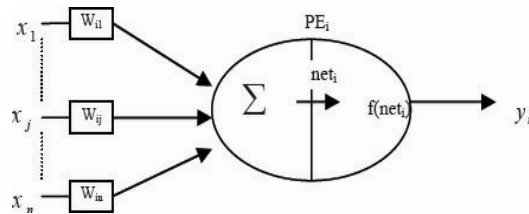


Figure1- processing elements

Ws are weights allocated for each input, net is function set and activity function, Xs are neuron inputs and Ys are neuron outputs.

Function set can calculate total balanced inputs and its formula is $net = \sum w_{ij} x_j$. The relation between activation level and output can be described using transferring function which includes various types such as tangent hyperbolic, Sigmoid, etc. feedforward networks are the ones whose connections are one-sided and they can be transferred from each neuron of data only to the next neuron, but the connection in feedback networks is two-sided [2].

Multi-layered perceptron networks or MLP are architecture of artificial neural networks which are feedforward and their processing are divided into various layers. In this networks, the first layer, input, last layer, output and middle layer are called hidden layers. This architecture can be named as the most applicable architecture among neural networks. In this study, the network used is for predicting series under study in feedforward neural network and it is multi-layered perceptron neural network type. To train and test the network, like ordinary methods of prediction, data were divided into two sections and these divisions are like quantitative methods of prediction. To determine value of neurons in input layer in artificial neural network, data of 2002 to 2010 and 2011 and 2013 were applied in order to train. After prediction and gaining values, to compare power of prediction we can use criteria of RMSE and R^2

$$R^2 = 1 - \frac{\sum (y_t - \hat{y}_t)^2}{\sum y_t^2} \quad (3)$$

$$RMSE = \sqrt{\frac{\sum (y_t - \hat{y}_t)^2}{n}} \quad (4)$$

In above relations, \hat{y}_t , y_t and n indicate value estimated, real value and data value, respectively. Also the best value for quadratic of correlation coefficient (R^2) is one and for criteria RMSE is zero [11].

Data used in this study includes wholesale price of veal during 2002-2013 which was gathered from information basis

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of department of animal and agricultural organization support and to conduct various steps, EViews and MATLAB Software were applied.

Results and discussions:

Results gained from estimating process of ARIMA:

In order to investigate efficiency of the model ARIMA in prediction of time series mentioned, first time series static was investigated with generalized Dickey-fuller unit root test. The results indicated that time series can be static after one time of difference, therefore, we can apply time series of ARIMA (p,d,q). After determining static time, number of auto-explanatory sentences (p) and number of mean animation sentences (q) will be calculated using a method suggested by Pesaran and based on criteria of Schwarz - Bayesian and then we will choose the model with the least value of Schwarz - Bayesian criteria.

After recognizing we will try to estimate the model based on the least value of Schwarz - Bayesian which concludes equation ARIMA (2,1,3). To control recognition the model will be investigated from aspect of good fit and its results show that remaining are white noise disturbance and as a result the model selected will be accepted.

Therefore, we choose the best model of ARIMA for wholesale price of veal in form of ARIMA (2,1,3) which is the least statics of Schwarz-Bayesian with value of 14/88. The results are in table (1).

1-Results gained out of estimating statics of Schwarz - Bayesian for wholesale price of veal

P	0	1	2	3	4
q					
0	AIC=0	AIC=14/9 8	AIC=15/0 2	AIC=15/0 4	AIC=15/1 0
1	AIC=15/0 2	AIC=15/0 2	AIC=15/0 6	AIC=15/0 9	AIC=15/0 7
2	AIC=14/9 1	AIC=15/0 1	AIC=15/0 6	AIC=15/0 4	AIC=15/1 0
3	AIC=14/9 4	AIC=14/9 9	AIC=14/8 8	AIC=15/0 9	AIC=15/1 0
4	AIC=15/0 3	AIC=15/0 4	AIC=15/0 9	AIC=15/1 3	AIC=15/1 9

Resource: the research results

Also the results related to choosing fine pause for wholesale price of veal is investigated in the table (2).

2-Results gained out of estimating process of ARIMA (2,1,3) for wholesale price of veal

	Variable name	coefficient	Standard deviation
C	Intercept	351/10	8/28
AR(1)	Wholesale price of veal with one pause	-0/97	-4/59
AR(2)	Wholesale price of veal with two pauses	-0/22	-1/02
MA(1)	Disturbance with one pause	1/45	7/10
MA(2)	Disturbance with two pauses	0/83	2/91
MA(3)	Disturbance with three pauses	0/52	3/94
	$R^2=0/37$	$F=11/74$	

Resource: the research results

The results achieved out of estimating process of the model of artificial neural network:

In order to investigate efficiency of the model mentioned during predicting wholesale price of veal, normalized data is used. Number of input neurons and also output ones in neural network can be determined through mapping which is presented to network. The only way for determining number of hidden layers and number of neurons in each layer and also type of activity type is through trial and error, so that if number of hidden layers and their value in each layer is not enough, the network won't be able to get to an optimum answer and if they are a lot in = number they will face instability.

In this study multilayered perceptron neural network was used which is a fine network for predicting time series. In this study logistic functions such as tangent hyperbolic and tangent sigmoid were applied in hidden layer and function of linear activity in output layer. Among calculative rules, error propagation learning algorithms were applied in hidden and output layers. Number of hidden layers changed from 2 to 30 and the best network was chosen with number of fine neuron. Finally, exploiting error propagation algorithm, each network was trained. The best network is a network with 2 neurons in input layer including 17 neurons of hidden layer whose design is in form of 2-17-1 and the network can get to the best answer in a repeated cycle of about 1000. R square is 99% model which is a substantial value.

Also the results related to choosing the best artificial neural network are in table (3).

3-Choosing the best perceptron price of wholesale price of veal during 2002 to 2010.

Variable name	Time horizon	Network type	No nl	nh	Function of hidden layer	Function of linear output layer
Real price of veal wholesale	7 months	Multi-layered perceptron	12	17	Tangent sigmoid	

Resource: the research results

In this table moreover function type used in the hidden layer of the networks, number of optimum neurons in input layer (nl), hidden layer ((nh) and output one (no) of each networks is presented.

The networks selected as the best one was compared with pattern of ARIMA. The results of prediction power of two models of neural network and ARIMA are brought in table (4) for wholesale price of veal:

4-Comparing prediction power of methods ARIMA and ANN for wholesale price of veal

Criteria Methods	RMSE	R ²
ARIMA	4773	0/37
ANN	1250	0/99

Resource: the research results

From the results of comparing prediction power of the methods under investigation we realized that method of artificial neural network is better than method ARIMA and it can predict the variables with least error.

Therefore, to predict the series, neural network method was applied. The results of predicting the variables during Sep to Nov 2013 are reported in table ((5). Likewise, in figure (5) the prediction conducted was compared with neural network method and real data.

5-Predicted values of veal price during Sep2013 to Nov2013.

	Sep	Oct	Nov	Dec	Jan
Wholesale price of veal	1072	1075	1072	1071	1075
	65	78	46	29	58

Resource: the research results

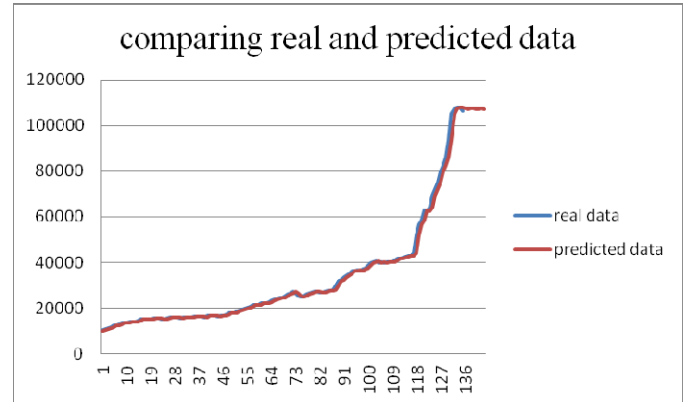


Figure2- comparing real data and predicted data of wholesale price of veal by method of artificial neural network
Resource: the research results

Conclusion and suggestions:

Predicting price has a key role in optimizing production, marketing and marketing strategy and also it plays an important role in policies of government.

The aim of the study is to estimate and present a fine model for predicting wholesale price of veal. The results gained out of the study show that the processes predicted y artificial neural network has more efficiency in minimizing prediction error. Power and high level of accuracy of artificial neural network give managers and policy-makers power in estimating demand in future and good decision-making. Therefore, according the high level of ability of artificial neural network in predicting price of the product, using this method can reduce investing risk to a substantial amount. Also it is recommended that experts and active specialists in this econometrics sector, to be equipped with different techniques of artificial neural networks so that the sage for future researches can be set, moreover institutionalizing using artificial neural networks.

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Determination of copper in ration and blood serum of dairy cows in Chaharmahal va Bakhtiari Province in comparison with standard levels.

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Abstract:

The purpose of this study is determination of the ration 's copper level and blood serum of dairy cows in industry farm of chaharmahal va Bakhtiari province. A total of 260 blood and 40 ration samples were randomly collected from four regions of Chaharmahal VA Bakhtiari Province including Farsan, Boroujen, Lordegan, Shahrekord and Zagros dairy farm. According to the results, the averages concentrations of copper in ration samples of Fars an, Boroujen, Lordegan, Shahrekord and Zagros dairy farm were 15.4, 20.11, 16.12, 21.13 and 28.54 mg/kg, respectively that, comparing with last studies, there are not any copper deficiency . Also the Average milk production was measured.

In this study there was a significant relationship between average milk production and ration copper ($p < 0.05$). Average copper blood serum in different regions was 0.68, 0.77, 0.69, 0.72 and in zagrose farm was 0.55 mg/L, respectively , that there is significant differences with there cities ($p < 0.05$). Compared with natural resources and industrial farms, was not observed copper deficiency level in blood serum of dairy cows. The results showed that there was not copper deficiency in ration and blood serum of dairy cows in Chaharmahal VA Bakhtiari Province.

Keywords: Copper, Minerals, Dairy cow, Chaharmahal va Bakhtiari, Iran

I. Introduction:

On the other hand, copper poisoning causes poor hair and fiber production in animals and anemia. Also, high levels of copper and zinc interferes, that, is required for building digestive enzymes and reduces protein detestability.[6]

At first Copper stored in liver, next in bone and then low in tissues. According some study, rations copper may affect calf growth performance, nutrient detestability and plasma copper.[3-4]. In 2001 the NRC

declared that the required amount of copper in the diet of dairy cows is 10 parts per million and the natural concentration of copper in the blood of cattle and sheep can be between 0.5 to 1.5 micro gram per milliliter and average is about 9 microgram per milliliter.[6]

Many clinical Signs associated with copper deficiency in cluderduced growth and weight, heartailments and anemia, fetal death, decreased ovarian activity and ovulation, heat reduction and increased incidence of dystocia. [5]

As regards, in Iran as well as chaharmahal va Bakhtiari Province little importance is given for the consumption

of minerals, specially Copper in the diet of dairy cows, and because of the important physiological functions of the semineral, so, the aim of this study was investigate the relationship between blood serum and

II. Materials and Methods:

In this study, stratified cluster sampling method was used. So that the classes consist of cities and main clusters, including clusters of different farms in each city and sub-clusters including the number of cattle. Sample feed rate of one kilogram per farm were picked separately and specifications was recorded. Also the blood samples were doing of 10 ml tail vein. The samples were centrifuged at 2500 rpm for 5 minutes, and their blood serums separated, and until samples analysis at - 20 ° C were maintained. For measuring of milk production, the average daily milk production of all dairy cows of per farms was recorded and registered. Also daily dry matter intake weighted and recorded on the same day of milk recording. According to AOAC¹ in 2008 dietary guidelines for samples feeds were prepared and then samples Copper were determined by atomic spectrophotometry device (Atomic absorption spectrometry).

For the measurement of trace elements in blood serum, first, one ml were separated next, for releasing of Cu 2mL of 5% nitric acid solution was added to the sample, then, with distilled twice distilled water was brought to a volume of 25ml, And after centrifuging (3000rpm for 3 min) the solution was injected into the device and concentration elements was readied.

The results were subjected to statistical analysis using SAS software. SAS programs were used for determining the effects of various factors on zinc of GLM procedure and to investigate the association between dietary consumption and blood concentrations of Cor procedure.

The statistical model is designed according to following model:

$Y_{ij} = \mu + T_i + A_j + e_{ij}$ = Observed values of measured traits, μ = Average characteristics, T_i = The effect of the experimental area, A_j = Random effect of animal, e_{ij} = experimental error (residual effects).

III. Results:

Average copper in rations in the Farsan city 15.4 and in this city 21.13 and the city Borojen 20.11 and the city Lordegan 16.12 and in the Zagros dairy farm 28/54

concentrations of rations copper in dairy cattle and compared with standard levels.

parts per million. Average diets in dairy herds studied copper Order 18/2, respectively, in millions. The average copper in rations was 18.2 in million in all studied farms (province) (table1). High levels of dietary copper was Zagros dairy farm that there is significant differences with Farsan city ($p < .05$), But this figure is on a level with the other cities.

¹Association of official analytical chemists

Table1: average copper in rations of shahrekord, Farsan, Boroujen, Lordegan, and Zagros dairy farm.

province	township					adjective
	Zagrose farm	shahrekord	lordegan	Borojen	Farsan	
۱۸/۲۰	۲۸/۰۴ ^a	۲۱/۱۳ ^{ab}	۱۶/۱۲ ^a	۲۰/۱۱ ^{ab}	۱۰/۴ ^b	Average of copper (ppm ¹)

per million – ۱
(p<0.05) the different words show significant different – ۲

Average milk production and dry matter intake in the Farsan city 20.1 and 19.2 kg respectively, in shahrekord 20.2 and 20.8 kg respectively, in Borojen 21 and 16 kg respectively, in lordegan 18.7 and 20/6 kg respectively, and in zagrose dairy farm was 34 and 19 kg respectively. The zagrose dairy farm had the highest

level of milk production and significant difference with other cities. (p</001).

In total farms in the province, the average milk production and dry matter intake, was calculated, 19.95 and 19.15 kg respectively. (Table 2). The results of a correlation between copper diets with milk showed a statistically significant relation (p<0/05).

Table2-Average milk production and dry matter intake of dairy herds in Shahrekord city Boroujen ,lordegan, Farsan dairy farm Zagros.

province	township					adjective
	Zagrose farm	shahrekord	lordegan	Borojen	Farsan	
۱۹/۹۰	۳۴ ^a	۲۰/۲ ^b	۱۸/۷ ^b	۲۱ ^b	۲۰/۱ ^b	Average of milk production (kg)
۱۹/۱۰	۱۹ ^a	۲۰/۸ ^a	۲۰/۶ ^a	۱۶ ^b	۱۹/۲ ^a	average of dry matter (kg)

(p<0.05)the different words show significant different – 1

Average blood serum copper in the Farsan city, Boroujen, lordegan, Zagros and total dairy farms in the province was 0.68, 0.72, 0.77 , 0.69 , 0.55 , 0.71mg in liter

respectively . Boroujen city had most level, that significant difference was observed between the Borojen city and dairy farm Zagros (p<. /05).

Table3-Average copper in blood serum of dairy herds in Shahrekord city Boroujen, lordegan, Farsan and dairy farm Zagros.

province	township					adjective
	Zagrose farm	shahrekord	lordegan	Borojen	Farsan	

1/1	1/00 ^b	1/12 ^a	1/19 ^{ab}	1/14 ^a	1/18 ^{ab}	(mg/l) Average of copper
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(p<0.05) the different words show significant different

IV. Discussion

Copper concentration in the diet:

The amount of required copper in the diet and presence of substances that can be interfere with copper absorption is varies. Only between 1 to 5% of copper diet will be absorbed by adult dairy cows. [8]

Copper concentration in the diet proposed and estimated by National Research Council (NRC 1989), 0.7 Kg average daily gain for heifers 500 kg is 10 mg per kg of diet, and estimates 10 mg per kg diet for 650 kg cow with 40 kg milk per day, while (NRC 2001) has been suggested for the heifer with the above conditions, 12 mg per kg and for dairy cow 15 mg per kg. [5]

In one study, the amount of dietary copper level of 10 mg per kg was reported. [3] In a survey with topic about mineral use in dairy cow, the recommended copper level in rations 10 mg per kg was reported [8]. As regard of the vitamins and minerals on the fertility of dairy cows, the recommended copper in rations have been reported 10 mg per kg in dry matter. [7] Average copper diets under review, was slightly higher than Offer rate

V. Blood Serum copper concentrations:

a study on Canadian beef cattle Was performed, and Cu and Mo concentration have been studied, with The sampling of the 791 beef cows in the pasture Was reported that about 75 percent of them had their blood serum copper level less than .6 In milligrams per liter. [1]

In another study the effect of different levels of copper intake on concentrations in dairy cattle in tissues was investigated. The diet that Copper level was 10 mg per kg, the liver copper levels was 364 milligrams per kilogram, and blood copper levels were 65 mg per liter, While the amount of copper in the diet was 4 mg per kg the liver copper levels were About 164 mg per kilogram and blood copper levels of 0.33 milligrams per, that with

VI. conclusions

As a result of this study, there was not shortage in serum copper levels and diets of dairy cows in this province.

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,but is the tolerable range cattle, because The level of dietary copper toxicity in cattle have reported about 100 mg per kg [5].

Given that copper oxidation of glucose in the body and thus helps to release energy, and is active in the metabolism of proteins and carbohydrates by metallo enzyme performance, and to make the necessary digestive enzymes, and according to the roles listed, appropriate amounts of copper in the diet can be quite relevant with milk production.

In this study, we measured the average milk production in the cities that were studied. A correlation between milk production and correlated with dietary copper with a percentage of 40% was calculated. The average dietary copper under consideration in this study is higher than the recommended levels in NRC 2001, that the cattle received appropriate amount of copper by rations.

Reduction of amount of copper in the diets, the copper in liver and blood serum have been reduced

Studies have shown that a normal level of serum copper levels in cattle is 0.5 to 1.5 mg per liter and average 0.9 gram per liter. [2-5]

In the present study, serum copper levels in dairy farms Zagros significant difference was found for other city. Comparison of serum copper levels in the city of subjects with normal levels of Studies, Showed that the level of copper deficiency was not found in the blood serum of dairy cows and were all normal.

Given that the diets copper levels in most studies, was normal and same as the proposed level it was expected that there are the normal blood levels of copper. Significantly and influenced by dietary copper levels. [3]

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Entrepreneurship and Rural Tourism

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Abstract-Entrepreneurship is the engine of development. Three important causes of attention draw to entrepreneurship is wealth creation, technology development and productive job creation. In this regard, tourism is one of economic sectors which because of necessity of relation between tourist as explorer man, venture and nature highly depend on the degree of entrepreneurship participation. Importance of entrepreneurship on wealth creation and tourism as potential instrument for distribution and redistribution of wealth in all society levels, looks as incorporative entrepreneurship in tourism sector can help as effective factor on development and empowering the local society. In this paper by attention to concepts and features of entrepreneurship and tourism, study the entrepreneurship development necessity and recommendations for entrepreneurship level incorporation with tourism industry. The research methodology of the study is review study by official and academic references domestic as well as international databases has been used.

Key Words – Entrepreneurship, Rural Tourism Tourism Development,

I. Introduction

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In the modern world which environmental conditions changing quickly, various business men always are facing changes in tastes and market needs. Domination in such competitive and challenging environment and disturbance of these conditions requires the managers with innovative, venture which aware about environmental opportunities. In anthropology of human, a group of people marked as entrepreneurs who can properly manage the resources and changing the threats to opportunities and opportunities to wealth. Entrepreneurship is the engine of development that by using changes and innovation lead to production growth and services in economy. In this regard, most of world countries by following the Schumpeter's theory that: "entrepreneurship is engine of development", believe that entrepreneurship has inevitable role on productivity improvement and increasing economic growth of country and it is synonym of individual, organizational and national success. On the other hand, different researchers by reviewing the different countries and regions experience on tourism development, emphasizes on the important role of local & rural societies as host society on successes of tourism activity in region and remind it as most important element of development of this activities.

Based on the findings of those researches, they believe that in the under developed regions such as rural areas, tourism development in the first step should be the response for economic and financial needs of local people. In this regard, poverty and unemployment are two main problems of these regions that tourism development lead to solving these problems of the society.

Rural tourism development lead to economic growth and poverty reduction that will encourage the investment growth and social services development. Therefore, rural

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tourism with new demand creation consequently brings new job opportunities, household income level increase, cultural incorporation, awareness level increase, changing the present structures and infrastructures creation will provide the necessary groundwork for developing various activities.

Rural tourism is one of the economic sectors that needs high degree of entrepreneurship participation. In respond to increasing demand and various tourism needs, various tourism services required. Therefore entrepreneurship and tourism incorporation because of interplay to each other and added impact on eco-social development have significant importance for study and analysis.

Therefore effective factors and policies on entrepreneurship development on rural tourism should be determined and finally required recommendations and solutions has been given.

The following section will review the concept of entrepreneurship, entrepreneur and tourism:

1- Entrepreneurship :

The word “entrepreneurship” will refer to French word of “Entereprendre” means undertaking and having five components as follow:

- a- Entrepreneur: person who decide by awareness and start new venture business and he is most key element of entrepreneurship process.
- b- Opportunity: There are many business opportunities in society, but entrepreneur try to identify the market situations by analysis and selectively decide on high potential alternative opportunities.
- c- Structure: the entrepreneur must recognize that in which business frame work should start his activity.

- d- Source: The entrepreneur must identify his financial and human resources and attract the investors support.
- e- Strategy and Plan of Business: The entrepreneur must determine his original aims and strategies and determine his comprehensive business plan.

Schumpeter applied the entrepreneurship phenomena as evolutionary factor of economy and called creative destruction. He believes that entrepreneurship was the main engine of economic development and the role of entrepreneur is innovation and creation of new combinations of inputs.

Therefore, entrepreneur is somebody who imply one of following cases in various businesses:

- New product creator or new quality in product aduse
- New method of production arises for production
- New market arises for output
- Using new resources
- New organizational shape (chart or structure) in industry arises

2- Rural Tourism

Tourism as sum of activities that people because of entertainment, rest, trade or like that travel to far away locations. The tourism industry is combination of different activities that try to give services as chain , consequently rural tourism includes all phenomena and relations between tourists, supplier and product sellers of produced in villages and host societies in attraction process and hospitality of tourists. Nowadays , rural tourism that much developed that moreover the role of that of rural development , also as effective factors on infrastructural planning for economic as well as social and cultural development.

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Specially in developing countries, that production or extraction were inadvisable economically or does not having important role on trade and business sence. Rural tourism development more than its role and impact on nationalism and social security , leads to imrpovment of economic dimentions such as job opportunities creation, income creation, poverty reduction and social equality development and welfare in rural society.and also it is encouraging the investment development in alternative sectors of economy.

II. Literature Review:

Sidali and et al (2007) studied the success factors of individuals in rural tourism development by interview with three groups offarmers with different level of success. Their research findings explains that the entrepreneurs personal artifices, the quality of hospitality and attraction capability of farm in successful entrepreneurs group in compare with other cases,

Cunha & Marques in their study emphasized on the necessity of incorporation of entrepreneurship and rural tourism to creation of the concept of rural tourism entrepreneurship. These researchers recommended that local resources along with entrepreneurship activities uses for rural tourism development that lead to innovative products such as foods, beverages, natural sightseeing and like these in rural areas.

In local studies, dadvarkhani and et al (1390 - 2011) investigated the role of tourism on entrepreneurship features unbringing and entrepreneurship attitudes of youth in kandevan and eskandan village. The study findings illustrate that kandovan village in terms of extraordinary nature and also geographical location and attractions, having high potential of tourism attraction and entrepreneurship development. Moreover,

kandovan village youth in compare with eskandan village empresing more entrepreneurship features.

III. Research methodology

The aim of this research is recognition of the concept of entrepreneurship and impedimenta in front of using entrepreneurship in tourism industry to develop the tourism economy in the country. In this paper applied research methods and descriptive analysis. Regarding data collection in this paper, the secondary data used and review study of official references applied.

IV. Discussion and Analysis:

Nowadays entrepreneurship in rural tourism is very important. For developing different regions in attracting tourism, the role of tourism entrepreneurship can be very critical, therefore finding a new concept of livelihood and alternative for entrepreneurs is essential. Environmental responsibility of entrepreneurship can be the basis for the use of natural resources and can have special emphasis on the values of renewable natural resources.

Several studies have shown that job creation is one of the main goals of developing rural tourism sector and ultimately economic development and entrepreneurship is its important mechanism and tool. In fact, the promotion of entrepreneurship in rural tourism reduces unemployment in rural areas and increases the productivity of individuals and resources, and consequently will increase social revenue. However entrepreneurship in rural tourism is not the only solution for increase the employment and income in this sector, but it certainly is the best and have the highest productivity.

Theoreticians believe that often the development of tourism based on local entrepreneurship is dependent on local resources and local labor supply and is less

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affected by the negatively socio-cultural in correlated to foreign ownership.

In this case, local ability of rural has been increased by tourism activities and it creates opportunities for active community participation in ownership and charge of facilities. Researchers say that tourism businesses of rural small family contribute to environmental, social and economic benefits in the following ways:

- Providing sustainable solutions against the economic and social challenges by services and labor employment,
- Purchasing goods and services from suppliers rural,
- Preserving the natural environment of rural,
- Attract investors, who are looking for lifestyle changes,
- increasing value of society.

Results of the studies show this fact that non domestic or foreign invest in building hotels, stores and other infrastructure needed for tourism in rural and import needed commodities of tourism due to poor financial strength rural residents.

From the perspective of rural residents, haven't important jobs or organization positions in this industry and haven't participation in policy making and decision making about promoting of tourism, is one effects of this investment.

A. Applications of entrepreneurship in rural tourism

The most important applications in the field of rural tourism entrepreneurship can include:

- Encouraging creativity and innovation and developing it, increasing confidence and ultimately wealth in rural tourism in rural communities and increasing public welfare.
- Increasing profits and capital, investors and, ultimately, providing the welfare of tourism sector and social welfare.
- Change values and their nature and creating new value in rural tourism.

- Omitting labor market gaps, it means that new decisions are taken according to the market condition and providing new opportunities.

Transit from recession, recovering the economic backwardness and facilitating growth and development of the rural.

- Prevent backwardness of economy after the crisis and the failure of economic sectors in creating employment.

- Cultural development and the eliminating social abnormality caused connection with various tourists.

- Expanding domestic and foreign tourists and attracting foreign exchange for the country's development.

- Rising popularity of rural entrepreneurship and creating of self-worth and social status.

The impact of entrepreneurship on rural tourism is very expansive. Some of these effects include:

Employment, cultural growth, encourage investment, identify, create, and develop new national and international relationships, increase welfare, and organize effective use of resources, economic development and growth it and improve the quality of rural life.

According to presentations about entrepreneurship in tourism, we can say: Although the origin and nature of entrepreneurship in rural tourism haven't different with urban areas and other economic sectors, however, the inputs required for the development of entrepreneurship in other industries like investments, management, training and technology can be found easier rural tourism.

In fact, today's, one of the most important aspects of tourism is entrepreneurship that will be increasingly important. Because of changes in the composition of creating income and the economy of rural society are factors that need to entrepreneurship in rural tourism more than ever before.

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We can say that entrepreneurship in rural tourism means applying creativity and innovation in tourism activities in the villages. It's notable that innovation will not lead to entrepreneurship and rural tourism development alone, unless it is combined with the capabilities and functions of management.

B. Effective policies on the development of entrepreneurship in rural tourism

It is clear that entrepreneurship needs to ready environmental for growing and an environment that is not compatible with entrepreneurial activities will be the biggest barrier to entrepreneurship, while a supportive space encourages entrepreneurs to engage business opportunities.

Set of environmental factors that can be considered supportive space components include: relevant socio-cultural factors, supportive legislative and policies, supportive factors, economic factors and physical factors.

C. Socio-cultural factors

According to sociologists, supply of entrepreneurial talents is cause of differences levels of entrepreneurship.

Psychological theorists believe that entrepreneurial behaviors are innate or learned behavior, but Sociologists believe that entrepreneurial behaviors are consequence of socio-cultural factors, such as culture, social structure, society aspect, community leadership and political ideology like historical condition.

Entrepreneurs and entrepreneur companies are taking steps with changes and try to explore the created opportunities and to exploit of them.

Entrepreneurial culture is including positive social attitudes about personal businesses.

An entrepreneurial culture reflects social support of the business in response to uncertainty and competition. In addition to the necessary entrepreneurial culture, it is

essential that upswing in tourism and related businesses in the community must be considered to develop of entrepreneurship in tourism destinations.

D. Legislative and policy factors

Londestrom and stivensen (2001) argue that entrepreneurship policies should be designed to encourage entrepreneurial activities that affect motivation, opportunity and skills before starting, starting and after starting of entrepreneurial process.

Supportive environment of government are examined in the form of macroeconomic policies. Macroeconomic policies are divided into three sections:

Financial Policies: are including tax that the lower general rate of tax for entrepreneurs is better than tax incentives.

Monetary policies: are including the supply of capital and the rate of monetary growth. Interest rate is extremely important with increasing business investment.

Regulatory policies: are including administrative responsibilities, processes and requirements of business establishment.

In addition to the above policies, developmental policies of tourism industry will create entrepreneurial opportunities in this sector.

E. Supportive factors

We can support entrepreneurs, especially in rural entrepreneurs with the creation of institutions that have the following functions:

-Training entrepreneurship in all institutions and newly established businesses.

-Collecting Data and analyzing them to provide appropriate information about the new organization.

F. Economic factors

Economists have shown that economic factors such as interest rates, inflation rates, benefit rates and the barriers of start, are determinant factors the level of entrepreneurial destination. According to this view, capital supply is the driving force of entrepreneurship and

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consumption. Without the availability of capital and risk with a reasonable price, small businesses well organize in the informal sector.

But from the perspective of Keynesian economics, human is seeking interests naturally and in every society, there are people who have intrinsically motivated to obtain economic benefits. Whenever there is an imbalance between supply and demand, entrepreneurs show themselves rapidly.

With attention to the rural tourism industry as the demand side, this area has always been provide for entrepreneurs that they use of these opportunities in rural products by innovation.

G. Physical factors

Physical factors are divided into two categories: natural resources and physical infrastructure:

-Physical environment of village: always nature reserve (Earth, air, water, plants, wildlife and natural resources) has effective role in providing of human needs and nowadays it is acceptable that this environment plays an important role in shaping tourism.

-Entrepreneurial infrastructure: Government plays an important role in providing the physical infrastructure (Roads, streets, water supply, easy transportation and flowing ...) necessary for trade. Businesses in general and Entrepreneurship specifically needs to these systems.

V. Results and Consequences

Today's, tourism industry especially rural tourism has a special place and it has been formed of numerous industries and a large number of different economic activities such as hotel, restaurant, accommodation, recreation, transportation, etc. While the reviews and investigations about this case indicate that are not used such opportunities.

According to the above cases, entrepreneurship can be considered as strategy

to reduce the problems. In recent years, in Iran, entrepreneurship has been attended and recently encouraging policies of tourism entrepreneurship has been done, but unfortunately, little attention has been taken to the initial step in the implementation of these policies that are requirements of entrepreneurship.

In addition, supporting of entrepreneurs should be considered through providing motivational factors such as financial incentives or support, education and training.

These factors can be unique in the early stages of their work and creating tourism services and they can help to constant development of tourism and policies that can create public awareness about the benefits of entrepreneurship to the economy and society should be promoted.

According to the literature, following factors can have effective role to promote entrepreneurship in rural tourism:

-Implementation of promotional activities such as conferences and festivals are good tools to implement and institutionalize a culture of entrepreneurship and the creation of productive employment in the community due to the linking of the four entrepreneurial processes (Ideas, funding, design and implement business).

-Providing long-term and low-interest loans and tax exemption for entrepreneurs,

-Legislation to guide entrepreneurs in action,
-Encourage entrepreneurs to institutionalize entrepreneurship,

-Providing appropriate infrastructure and promoting entrepreneurship in rural tourism,

-Formulation of encourage policies for entrepreneurship and privatization in the field of rural tourism,

-Facilitate laws relating to the creation of new businesses in the field of rural tourism.

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Applications of inulin in food industries: A Review

Soofi. M, Alizadeh. A

Abstract—Dietetic foods are the most demanding food groups these days, to repel the obesity. Fat reduction or elimination will deteriorate the food acceptability as taste and texture. Fat replacers such as inulin, which produces a stable gel and creamy texture, are being used, frequently. Inulin has three forms according to its polymerization degree as native, short and long chain. Each type has different applications in food industries.

Keywords—dietetic food, fat replacer, inulin, polymerization degree

I. INTRODUCTION

Consumption too much levels of fats and oils in the diet, may increase chronic health risks and also is stated to be related to cardiovascular diseases. Eating too much fat may increase weight, as well. Nutritionists are advising people to lower fat consumption, specially the fats rich in saturated fatty acids and cholesterol. Therefore, effort is made to produce low caloric foods with high levels of acceptability.

Lowering or elimination of the fat content of a food product, not only disrupts its texture, but also, may affect the flavor perception. Interactions among various ingredients in the food complex are the contributing reason for perceptible changes in color, flavor and aroma and ultimately less acceptable products [1], [2]. To overcome the mentioned problems, associated with fat reduction or elimination, addition of fat replacers or fat mimetics is the most frequent applicable method to retrieve the defects in texture and acceptability. Fat replacers have several chemical and sensory properties with different functional properties. Therefore, choosing the appropriate fat replacer is most important factor in low fat food processing.

Inulin is one of the fat replacers that are widely used in production of low caloric foods. The extensive use of inulin in food industry is relevant to the nutritional and technological properties of inulin. Technologically, inulin could be used as a sugar replacer (especially in combination with high intensity sweeteners), a fat replacer or a texture modifier [1], [2]. Therefore, in this study inulin structure and various

applications of inulin in production of low-caloric foods will be discussed.

II. FUNCTIONAL PROPERTIES OF INULIN

Fructans are reserve carbohydrates in at least 10 families of plants that reserve them in a soluble form in vacuoles, leaves, roots, stems, tubers, or kernels. These components are also existed in fungi and bacteria. Depending on the plant and the plant organ, the fructan's linkage type and length vary greatly. Fructan-containing plants are mainly angiosperms. The fructan-containing species belong to both mono and dicotyledonous families. Some of these plants are consumed as vegetables such as artichoke, asparagus, chicory, garlic, etc. [3].

Fructans accumulate in various species of aspergillus, but some species synthesize it extracellular from sucrose, as well. Particularly, it has been stated that *Aspergillus sydowi* synthesizes an inulin with a molecular weight greater than that of plant inulin. With the exception of certain strains of *Streptococcus mutans* that produce inulin-type fructans, the bacterial fructans are essentially of the levan type. Fructans or the genes for their synthesis appear essentially in five orders or families of bacteria, namely the Gram-negative aerobic (*Pseudomonadaceae*) and facultative, anaerobic (*Enterobacteraceae*) rods and cocci, the Gram-positive cocci (*Streptococcaceae*), endospore-forming rods and cocci (*Bacillaceae*), and *Actinomycetaceae*. Table 1 shows chemistry of different kinds of fructans. The difference between inulin and fructans (another group of fructans) and accordingly the sweet taste of these compounds are associated with sucrose molecules in their structures [3].

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Table.1 Chemistry of Fructans [3]

Name	Chemical Structure	Natural Origin
Inulin	Linear, branched, cyclic	Plant, bacteria, fungi
Levan	Linear, branched	Plant, bacteria, fungi
Phlein	Linear, branched	Plant
Graminan	Linear, branched	Plant
Kestoses	Linear, branched	Plant

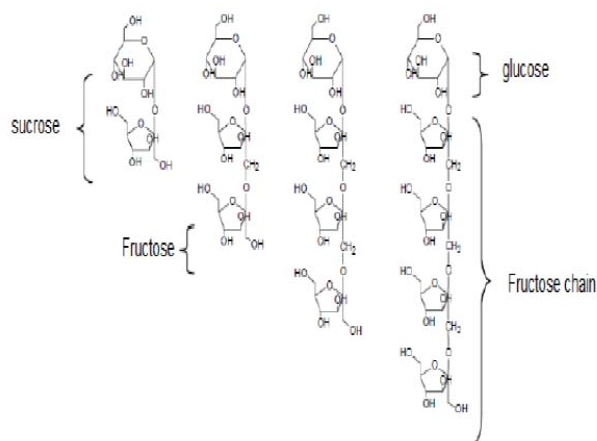


Fig.1 Chemical structure of inulin [4]

Chemically, Inulin is classified as a non-starch polysaccharide and fructans. Inulin is a carbohydrate, made up of $\beta(2,1)$ -linked fructosyl residues, mostly ending with a glucose residue. Fig. 1 shows the structure of an inulin

molecule which is present as a reservoir carbohydrate in a large number of plants or an extracellular polysaccharide in some microorganisms [3], [4].

Inulin has a lower caloric value than typical carbohydrates (at approximately 1.5 kcal/g compared to 4 kcal/g) and it can be applied as a fat replacer in low fat dairy products (yoghurt, custard, mouse and cheese), bakery products, beverages, cereals and spreads [5], [6]. In addition to these food applications, inulin is also used in non-food applications as a filler/binder in tablets. Chemical derivatives of inulin are also used in industrial applications [1]. Table 2 shows some of the main sources of inulin. Inulin has a neutral taste (about 10% the sweetness of sucrose), is colorless, extremely high soluble without significant effect on the sensory characteristics of the food product. It can form a gel when mixing with water. This compound has a small molecule compared with other hydrocolloids and therefore it shows a low water binding

capacity at low concentrations. Increasing its concentration

Table.2 . Inulin content and chain length of different plants [3], [6]

Plant	Inulin g/100g	Chain Length Degree of Polymerization (DP)
Globe Artichoke (<i>Cynara scolymus</i>)	2–7	DP $\geq 5 = 95\%$
Banana (<i>Musa cavendishii</i>)	± 1	DP $\geq 40 = 87\%$
Barley (<i>Hordeum vulgare</i>) very young kernels	0.5–1 ± 22	DP $< 5 = 100\%$
Chicory (<i>Cichorium intybus</i>)	15–20 Mean 16.2	DP $< 40 = 83\%$ DP 2–65
Dandelion (leaves) (<i>Taraxacum officinale</i>)	12–15	DP $\geq 5 = 75\%$
Garlic (<i>Allium sativum</i>)	16 Mean 13	DP $\geq 5 = 75\%$
Jerusalem Artichoke (<i>Helianthus tuberosus</i>)	17–20.5	DP $< 40 = 94\%$ DP 2–50 DP $\geq 40 = 6\%$
Leek (<i>Allium ampeloprasum</i>)	3–10	DP 12 is most frequent
Onion (<i>Allium cepa</i>)	1–7.5 Mean 3.6	DP 2–12
Salsify (<i>Scorzonera hispanica</i>)	Mean ± 20	DP $\geq 5 = 75\%$
Wheat (<i>Triticum aestivum</i>)	1–4	DP $\geq 5 = 50\%$

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higher than 15% w/w could form a stable gel or creamy texture. Such gel can imitate texture of fat in food products. Shear force application causes water absorption of inulin particles and produces excellent texture and features with good flow behavior. So, it can be used as fat replacer in different kinds of foods [5], [7], [8], [9]. This compound also acts as a functional food additive due to their prebiotic properties [8], [9]. Inulin after passed through the mouth, stomach and small intestine remained unchanged and reaches to the large intestine and then fermented by the anaerobic intestinal microflora and products short-chain fatty acids such as acetate, propionate, butyrate, gas and increases bacterial mass [5], [8], [10], [11]. Inulin also improves mineral absorption of calcium, magnesium and immune function and lowers cholesterol and blood lipid levels, [12], [13], [14], [15].

Inulin is categorized in three types according to its polymerization degree as, Native or medium chain length inulin having a degree of polymerization (DP) ranging from 3 to 60 monosaccharide units with an average of about 10; its partial enzymatic hydrolysis product is called oligofructose

(OF) or short chain that has a DP ranging from 2 to 8 with an average of about 4 monosaccharide and finally, long-chain inulin with average DP of about 23 and a DP ranging from 10 to 60 which can be produced from native inulin by applying specific separation techniques [1], [9].

The physico-chemical properties of inulin are dependent to the degree of polymerization. The short-chain fraction, oligofructose, is much more soluble and sweeter than native and long-chain inulin, and can contribute to improved mouthfeel, because its properties are closely resemble to those

of other sugars. Long-chain inulin is less soluble and more viscous than the native one, hence can be used as a texture modifier [1].

Other physico-chemical properties that are influenced by DP include the melting and glass transition temperature, the gel formation capability, the subsequent gel strength and the interaction with other food ingredients such as starch or hydrocolloids. Obviously, these features are also related to the technical applications of inulin, especially for its application as texture modifier or improver. The reason that inulin acts as fat mimetic or fat replacer is based on its capacity to form microcrystals, which interact with each other and accordingly forming small aggregates that ultimately may agglomerate into a gel network [9], [16]. Table 3 shows examples about various uses of inulin in food processing.

III. HEALTH EFFECTS OF INULIN

More than 90% of the infant's intestinal micro flora is consisted of Bifidobacteria. The number of these bacteria is decreased in old ages. Significant reduction of these bacteria in

old ages is one of the factors that weaken the immune system during this period. Studies have revealed that a diet

supplemented with inulin, stimulated the growth of beneficial bacteria, specifically *Bifidobacteria*, in the colon, supporting immune function improvement and inhibit the growth of pathogenic bacteria. These compounds considered as functional foods, which is due to their prebiotic properties [8], [9], [18], [19]. Dietary inulin increases HDL cholesterol and

Table.3 technological applications of inulin in food industry [3], [17], [18]

Products	Applications
Dairy products	Body and mouth feel Foam stability Sugar and fat replacement Synergy with sweeteners
Frozen desserts	Sugar and fat replacement Synergy with sweeteners Texture and melting
Table spreads	Fat replacement Texture and spreadability Emulsion stability
Baked goods and breads	Sugar replacement Moisture retention Crispness and expansion
Breakfast cereals Fruit preparations	Sugar replacement Synergy with sweeteners
Meat products	Body and mouth feel Fat replacement Texture and stability
Chocolate	Sugar replacement Heat resistance

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reduces total cholesterol, triglycerides, fasting glucose and insulin resistance, all of which may help to decrease cardiovascular disease risks [23].

Inulin was found to significantly increase serum SCFA, which are associated with reduced postprandial free fatty acids (FFA) and ghrelin (a hormone that triggers hunger) concentrations. Furthermore, the reduced concentrations of ghrelin would help to reduce hunger and assist weight management, possibly decreasing disease risks, as well. Reduction the pH of the colon and production of SFCA will help reducing growth of potentially harmful bacteria. However, *in-vitro* studies showed that potentially harmful species of bacteria such as *Klebsiella*, *E. coli* and some species of *Clostridium* can also ferment inulin [20], [21], [22], [23].

Inulin is thought to increase the production of a glucagon-like peptide which stimulates insulin release and acts as an appetite suppressant. Other reported health benefits found through scientific studies were relief of constipation; increased

calcium, magnesium and iron absorption; treatment of chronic bowel inflammatory disease; prevention of colon cancer (due to SFCA production); regulation of appetite; reducing lipogenesis in hyperlipidemic subjects; and in infants, augmenting immune function, reducing atopic dermatitis and certain allergies [23], [24], [25].

IV. UNDERLYING MECHANISMS

As stated before, the specifications of long-chain inulin

contributing to its application as fat mimetic or fat replacer is based on its capacity to form microcrystals, which interact with each other, thereby forming small aggregates leads to agglomerate into a gel network. Thus, knowledge of the mechanisms of crystallization and particles aggregation is important to understand the effect of inulin addition to low-fat products as a fat replacer [1].

The degree of polymerization of oligofructose or short-chain inulin is inadequate to form microcrystal. Only native and long chain inulins in concentrated aqueous solutions can develop a gel structure formed by a network of crystalline particles. Longer chain inulin with DP > 10 is the one which participate in the gel formation while the smaller chains remain dissolved [1].

Initially, native and long-chain inulin form primary non-spherical crystals (0.5 by 3 mm) that aggregate including significant amounts of fluid phase, and afterwards the aggregates interact to form a gel. Crystallization rate, crystal size and gel firmness depend on inulin concentration, degree of polymerization, shear and thermal treatment and the presence of seed crystals [1].

V. CONCLUSION

Inulin is considered as one of the most frequent fat replacers in low-caloric food productions. Application of inulin in food is based on its nutritional and technological properties. Inulin is used as a sugar replacer, fat replacer and texture enhancer in the food industry.

Inulin as a fat replacer, not only leads to a positive change in the rheological behavior, consistency and hardness of the product but also, improve other features like producing creamy mouth feel and softness. In sum, we can conclude that inulin affects rheological and texture behavior of the food positively and these effects depend on the concentration and polymerization degree of inulin.

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Estimation Retention Curve From The Minimum Soil Texture Data

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Abstract— Determining soil water retention curve and the method of time-consuming, costly and less accurate. It is trying an approach that can be used to solve these problems. One of these methods of aggregation curves methodology is owned and logistics method, density soil is apparent. In this method, a parameter called α (scale factor) used linear and logistic method, and it's obtained or that is constant. It should be noted that a variety of methods such as soil gradation curve and Fredlund et al Skaggs method is estimated. In this study, 15 soil samples from the soil database UNSODA have been used. Also, the soil gradation curve of the model and a method for determining the scale factor was used Skaggs et al. Showed that the results for texture, using the linear method and Yazdi and Ghahreman medium texture, linear and logistic method, and a heavy texture, the best way methodology, is owned and logistics.

Keywords— Linear, Logistic, Soil texture

I. INTRODUCTION

SOIL water retention curve that represents the relationship between moisture content and soil water suction irrigation and drainage projects and issues related to the movement of water in unsaturated soils are frequently used. The curve of the physical behavior of different soil moisture contents easier. Soil moisture can be directly in the field or laboratory by different methods such as pressure plates, blocks, plaster, play neutrons, gamma rays and measuring the reflection survey. To obtain this curve is very time-consuming methods (for example, pressure plates) and are costly (e.g. gamma radiation).

Therefore, the researchers sought to obtain a less costly method for estimating the curve instead of where they were measured. Most of these methods are mathematical and physical basis and purpose of all they find is a formula that is simpler and less expensive tests could be close as possible to the experimental results. Many devious the methods, researchers' soil moisture content of estimates on other available information suggested.

Among the above methods can be provided by the methods of Brooks and Corey (1964), Campbell (1974), Hatsvn wax (1987), Sakstvn and colleagues (1986), Shan, et al (1987) and van Genuchten (1980) noted said.

Effect texture, bulk density, and soil organic matter on soil moisture and hydraulic conductivity is well known from a long time ago. However, due to the complex and heterogeneous environments is that the soil hydraulic properties that can change over time and space, to find a clear relationship between soil texture and hydraulic properties it is very difficult. However, we have tried using multivariate regression analysis, neural networks or certain parts of the curves of humidity - Suction - hydraulic conductivity based on texture, bulk density, mineralogy and organic matter is predicted.

Obviously mathematically moisture curves - Suction - hydraulic conductivity as a continuous function requires one or more parameters are adaptive. This parameter is usually through regression or neural network methods are designed to evaluate the main properties of soil. Since the soil moisture content at equilibrium as a function primarily of the volume of soil pores. Which have been filled with water, soil pore size distribution, which determines the parameters to predict moisture content and soil hydraulic properties is considered.

Among the available methods for estimating soil moisture characteristic curve of soil bulk density and particle size distribution curve. Accordingly Arya and Paris (1981), presenting a model to predict the soil moisture characteristic curve based on soil particle size distribution were prepared. In this model, soil pore size, which is assumed to form capillary tubes, the scale length of the pores is determined.

Non-spherical particles such as spherical particles with a diameter usually the same weight and size is expressed in the model through the pores in soil particle size distribution curve of the total diameter of the spherical particles is estimated. Then calculated for a spherical particle through the pore length scale parameter is generalized to the natural soil.

After all the above mentioned methods for predicting the characteristic curve of a scale parameter is required. Therefore Arya et al (1981). Linear and logistic methods for determining the value of α offered some soil textures.

Relations in several studies to determine the scale parameter is provided, including the study Fooladmand (2011) be noted that four different methods for determining a value independent of soil texture presented. Yazdi and Ghahreman (2004) also pleased hero based on the linear methods, relationships, and finally to estimate the value obtained from a study on the soils of Brazil and associates with an alternative to estimate a relationship started to offer also.

Arya and Paris by providing a model to predict the soil moisture characteristic curve based on soil particle size

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distribution were prepared. The two had met in studies on various soils, concluded that the scale factor in the range between 1.35 to 1.40 is the automatic 1.38 as the average of these parameters was proposed.

Arya et al. showed that the scale factor is not the same for different soil textures in the range of 1.1 for fine-textured soils to 2.5 for coarse textured soils vary. The method of linear and logistic regression methods for the determination of the scale parameter of soil organ presented.

Shu et al (1988). evaluated the scale parameter on soils with different textures concluded that this parameter is less than 0.95 for silt loam soils to 1.3 for loam soils vary. Smaller values for this parameter is one theory is correct, but Shu et al (1988). did not provide an explanation in this regard.

Yazdi and Ghahraman (2004) was showed this study confirmed that the scale parameter is not fixed quantity. On the other hand, showed that despite being different coefficients of linear prediction coefficients proposed by Arya et al (1981), can be based on soil particle size distribution parameters, to predict.

Skaggs et al (2001). the researchers devised a method for obtaining soil grading curve, using clay, silt and gravel soils offered. The researchers say the American system of classification based on soil particle radius soil particles (measured in micro-meters) were considered. Accordingly, the radius of 1000, 500, 250, 125, 50, 25 and 1 micrometer, respectively, the range of clay, silt, very fine sand, medium sand, coarse sand is very large. Researchers at the final radius of clay, silt, and sand fine adopted. In other words, only the very fine sand and fine gravel were considered.

Fooladmand et al (2011) in this study provided by Skaggs et al (2001) soil gradation curve to estimate the percentage of clay, silt and sand were used. Researchers were used radius of 999 m (nearly 1000 m radius, which is the final level of the sand soil).

Yazdi and Ghahraman (2004) researchers based on linear, logarithmic equation to estimate the value α obtained. Vaz et al. (2005) using 104 samples from Brazilian soil types, an exponential equation to estimate α offered. Huang (2004) Using data from 1385 to measure soil in Korea, 9 different estimation methods, including methods of aggregation Skaggs et al. (2001) compared the contract.

The results indicated that the Fredlund et al (2000) is more suitable than the other models. It was shown that the model Skaggs et al. (2001) for the texture of sand, silt loam and silty clay loam is better than other tissues gradation curve fit of the measured values can be.

II. MATERIALS AND METHODS

For this study, 15 soil samples from the soil database UNSODA (textures of sand, loamy sand, loam, silt loam, clay, silty clay, silty clay loam) were used. In this study, the aggregation model Skaggs et al (2001) and colleagues used the relationship of this method is as follows:

$$W = \frac{1}{1 + (cl^{-1} - 1)\exp\{-u(R - 1)^c\}} \quad (1)$$

Where R is the radius of dust particles per micrometer, W fraction of particles smaller than the radius, cl smaller particles of the clay fraction (in decimal), and c and u are the equation parameters are calculated from the equation.

The soil water content and soil water suction for estimating soil moisture characteristic curve based on the model of Arya et al (1999) the following relations are obtained:

$$\theta_i = \rho_b \sum_{j=1}^i V_{vj} \quad (2)$$

$$h_i = \frac{0.18}{R_i (en_i^{1-\alpha})^{0.5}} \quad (3)$$

Where θ_i moisture volumetric soil water in the i-th particle size distribution curve in terms of cubic meters per cubic meter, ρ_b Bulk density in terms of grams per cubic centimeter, V_{vj} volume of pores in the soil mass units in the i-th particle size distribution curve in cm^3/g , h_i suction soil water in the i-th particle size distribution curve in cm, R_i mean radius of soil particles in the i-th particle size distribution curve in cm, n_i the number of spherical particles of soil in the i-th particle size distribution curve in terms of g, α scale parameter and e than osteoporosis fixed soil. It is estimated that the W_i different radii, or particle size distribution curve calculated from the two methods mentioned in this paper is to determine the amount of V_{vj} .

As mentioned, there are several methods to determine the scale parameter α . In this study, four different methods have been used to determine α . Given that after using equation (3) the amount of soil water suction is estimated to be anywhere in the particle size distribution curve. The eight methods are:

a) Linier method:

$$\alpha_i = \frac{a + b \text{Log} \frac{W_i}{R_i^3}}{\text{Log} n_i} \quad (4)$$

b) Logistic method:

$$Y + \Delta Y = \frac{Y_f Y_{in}}{Y_{in} + (Y_f - Y_{in}) \exp\{-\mu(x + \Delta x)\}} \quad (5)$$

α_i parameter value scale in which every part of the particle size distribution curve, W_i -mass of soil solids per unit mass of the i-th gradation curve in terms of g, R_i and n_i previously defined. a and b are coefficients of the equation, Y represents the dependent variable $\text{Log} N_i$ (N_i number of spherical particles hypothetical soil anywhere in the particle size distribution curve is), x represents the independent variable $\text{Log} n_i$, μ intensity factor, $\Delta Y = \Delta \text{Log} N_i$, $\Delta x = \Delta \text{Log} n_i$, the indicator in showing the initial value (lower limit) $\text{Log} N_i$ and f index represents the terminal value (upper limit) $\text{Log} N_i$ is.

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Since the amount of moisture and humidity, vacuum suction estimated values measured are not the same in each case, so each case, the estimated water content and suction estimates on data related to soil moisture characteristic curve Van Genuchten (1980) was fitted. RETC software was used for this purpose and parameters of this equation were estimated. Accordingly, the coefficients obtained by van Genuchten equation (1980), the suction values measured soil moisture content was determined by the equivalent suction. Thus, soil moisture was measured at each suction and moisture estimates from different estimation were compared to determine the best estimate for each soil. For this purpose, the statistics standard error (SE), geometric mean error ratio (GMER) and geometric standard deviation error ratio (GSDER) the following equations were used:

$$SE = \sqrt{\frac{\sum (M_i - E_i)^2}{N - 1}} \quad (6)$$

$$x_i = \frac{E_i}{M_i} \quad (7)$$

$$GMER = \exp\left(\frac{1}{N} \sum \ln(x_i)\right) \quad (8)$$

$$GSDER = \exp\left[\left(\frac{1}{N-1} \sum [\ln(x_i) - \ln(GMER)]^2\right)^{0.5}\right] \quad (9)$$

The relative error in x_i , E_i and M_i respectively volumetric soil moisture estimated and measured in vacuum and N is the number of data per soil.

GMER amount equal to the measured and estimated values are consistent with each other. If GMER amount is less than the estimated values are lower than the measured values and the GMER amount is more than the estimated values are higher than measured values. If GSDER amount equal to the measured and estimated by increasing the overlap GSDER a higher level than the distance between the estimated values are compared with measured values. Therefore, the suitable conditions that GMER and GSDER values are close to one. In addition, the SE value is closer to zero, the difference between the estimated values and the measured values were less than perfect.

III. RESULTS AND DISCUSSION

Results Evaluation of methods for the determination of the scale factor in Table 1 light texture, medium texture and heavy texture in Table 2 Table 3:

Table 1. Evaluation criteria in light texture

	SE			GMER			GSDER		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Vaz Yazdi and Ghahreman	0.06	0.08	0.07	0.37	0.6	0.52	1.1	1.3	1.23
Linear	0.03	0.05	0.04	0.78	1.04	0.88	1.25	1.72	1.46
Logistic	0.02	0.08	0.06	0.6	0.83	0.75	1.06	1.29	1.18
	0.03	0.06	0.05	0.89	1.49	1.22	1.1	1.33	1.22

Table 2. Evaluation criteria in medium texture

	SE			GMER			GSDER		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Vaz Yazdi and Ghahreman	0.05	0.24	0.09	0.6	1.92	0.91	1.1	1.37	1.21
Linear	0.02	0.26	0.08	0.79	1.99	1.16	1.05	1.48	1.21
Logistic	0.03	0.18	0.08	0.4	1.69	1.07	1.11	1.52	1.24
	0.03	0.21	0.08	0.85	1.79	1.17	1.04	1.52	1.2

Table 3. Evaluation criteria in heavy texture

	SE			GMER			GSDER		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Vaz Yazdi and Ghahreman	0.02	0.12	0.07	0.72	0.96	0.85	1.02	1.13	1.07
Linear	0.02	0.12	0.08	0.8	1.42	1.1	1.02	1.15	1.08
Logistic	0.05	0.14	0.08	0.72	1.31	1.05	1.1	1.15	1.13
	0.02	0.12	0.07	0.75	1.29	1.03	1.03	1.14	1.8

IV. CONCLUSIONS

According to the evaluation index table, the points can be summarized as:

For texture, using the best methods are pleased Yazdi and ghahreman (2004) and linear methods.

For medium texture, linear and logistic methods are the best methods.

The heavy texture of best practices, techniques and methods of logistics is from.

Also, the results of the evaluation indicate acceptable model estimates gradation curve is Skaggs et al (2001) and colleagues.

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Modeling potential distribution of Chinkara (*Gazella bennettii*) in central Iran

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Abstract—The distribution and abundance of herbivores as an integral part of territorial ecosystems, have been affected by anthropogenic activities over the last century. The present research is aimed to quantify the relationships between chinkara in Isfahan and Yazd provinces and a set of related environmental variables using maximum entropy modeling. According to the results, chinkara is widely distributed at boundary interface of two provinces compared to other parts. AUC for model average running was estimated to be about 0.92, which, denotes on high model efficiency. Given to jackknife test and relative contribution percent of variables, the best predictors of chinkara distribute on were participation at the coldest month of year, distance from railway and slope percent.

Keywords— Chinkara, Distribution, Maxent, Maximum Entropy, Modeling.

I. INTRODUCTION

Nowadays, wildlife conservation and management is nearly impossible in case of ignoring habitat features. Whereas, about 80 % of total natural habitats are subjected to degradation [10]. Habitat destruction will certainly causes species extinction, thus to determine potential habitat for species has great deal of importance. Herbivores are found to be one of the integral part of territorial ecosystem and their population and distribution have been affected by anthropogenic activities all over the world [7]. Chinkara is a mammal whose population suffers vulnerability (2). Although *Gazella bennettii* is considered a species of least concern by the International Union for Conservation of Nature (IUCN) [8], however it has not desirable condition in Iran and serves as a vulnerable species for country [20]. In addition given its higher nutritional value for Asian cheetah (*Acinonyx jubatus venaticus*), so to species its distribution is appears to be necessary. At the same time, most of IUCN classification on conservational status are not accurate due to lack of sufficient information.

One way to determine the potential distribution of species is to use wide varieties of modeling methods [6] _ [29]. There are enormous multipurpose techniques to model species ecological niche and their geographic distribution [2] and [14]. Application of statistical models to predict the probability of species presence or distribution has great importance for wildlife conservation and management plans [29]. All over the world. Chinkara is a mammal whose population suffers vulnerability. The present research is aimed to model potential distribution of chinkara in Isfahan and Yazd provinces using maximum entropy modeling.

II. THEORY AND LITERATURE REVIEW

To the best of our knowledge, there have been rare reports in literatures on chinkara none of which have not dealt with its distribution. Among them, investigation of taxonomy, ecology and distribution of gazelle in Iran [19], reproduction in captivity of chinkara at Sabzevar shirahmad wildlife refuges (2) and evaluation of habitat preferences and group size of chinkara at wildlife refuges of DarehAnjir Yazd (1) are the most outstanding. Different modeling algorithms addresses in terrelations between species presence location and environmental data for species distribution models (SDMs) as well as interpretation of species geographical distribution maps [13]. The maximum entropy (Maximum Entropy or MAXENT) is one of the emerging areas of machine learning methods recently have widely used for modeling species distribution using environmental data on known location for species presence [26]. MAXENT first was introduced at 21st international conference on machine learning in Colorado, Canada [28]. It has been used widely for terrestrial [22] _ [5] _ [17] and aquatic [12] species. In respect to higher efficiency of this made [13], here, it was used to evaluate chinkara distribution.

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III. MATERIAL AND METHODS

Study area:

The province of Esfahan covers an area of approximately 107,027 square km, 6.6% of total country area and is situated in the center of Iran. It's coordinates spanned over 30° 42' to 32° 30' northern latitude and 49° 37' to 55° 29' eastern longitudes of Greenwich meridian. Yazd province is also locate at center of Iran and has an area of 131,575 km² in coordinates 29° 52' to 33° 27' northern latitude and 52° 55' to 56° 37' eastern longitudes (figure 1).

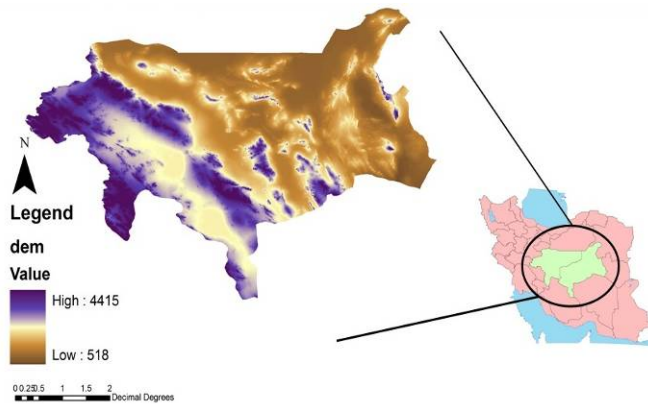


Fig1: Study area and its position in Iran

Data preparation:

Data on chinkara presence in Isfahan province was obtained according to records by the guards of the sites. Many of the sites have been recorded by the camera and some by registered profile. In Yazd, the limits of species presence were drawn through interviewing experts on paper maps were, then it was entered into GIS to determine presence points on them.

Here, number of most determinant variables on species distribution were used. These were fell into three groups: 1-climatic variables: The annual mean temperature, mean daily temperature range, isothermal, seasonal temperature, the maximum temperature of the warmest month of the year, the minimum temperature of the coldest month of the year, the annual temperature range, mean temperature of warmer quarter of the year, mean temperature of colder quarter of the year, mean temperature of drier quarter of the year, mean temperature of most humid quarter of the year, annual precipitation, precipitation of the driest month of the year, precipitation of the most humid month of the year, seasonal precipitation, precipitation in colder quarter of the year, precipitation in warmer quarter of the year, precipitation in drier quarter of the year, precipitation in more humid quarter of the year, 2-physiographic variables: slope, aspect, elevation, 3-other variables: Distance from residential areas, Distance from the road, the distance from rivers, landuse, vegetation types, vegetation status, distance from the railway,

vegetation canopy cover. Among these, continuous variables first were entered into principles components analysis and most determinant variables on extracted factors were selected. Then for the selected variables, the Pearson correlation matrix was drawn and the variables with correlation up to 70% were chosen. In addition, the model was run using all discrete variables and those discrete variables with contribute more than 1% were selected for entry into the model [4]. Finally, number of eight variables were entered into the main model (Table 1). Both principal component analysis and correlation matrix analysis were carried out on SPSS software version 18.

Table 1: selected variables to be entered into model and contribution percent of each to run model.

Variable number	Variable	Abbreviation	Percent contribution
1	Distance from railway	dis_railway	12.7
2	Distance from road	dis_road	0.4
3	Distance from residential areas	dis_u	3
4	Landuse	landuse	1.4
5	Mean temperature of colder quarter of the year	pcq	13.14
6	seasonal precipitation	ps	26.3
7	Slop	slop	29.7
8	Mean daily temperature range	tar	13.1

Model running:

Model was run using cross validate replication algorithm. So percent of training and test data, automatically was determined by the software. The number of replications was set at 20 times and number of running was set as 5000 times.

Final utility map was prepared using a threshold 10% [25].

Model validation:

MAXENT model is characterized by validation self-sufficiency. AUC assess whether location of species presence selected in randomized manner has much more predicted value compared to those for absence. For AUC values, accuracy levels based on Swets (1988) classification provides an indicator on mode differentiation potential [16] (table2).

table 2: classification AUC (Swets) [16]

AUC	Accuracy rate (an indicator of the model efficiency)
0.5- 0.7	low
0.7- 0.9	medium
>0.9	high

Jackknife test:

It is a part of model output. It is related to variables importance and contributions and is used to calculate each predictor relative vigor [1]. The results of this test can be achieved in case of several times running. It consists of three parts: (1) to use all input variables, (2) to use of all input variables except one variable, (3) to use only one input variable [1].

IV. RESULTS AND DISCUSSION

Distribution map:

Figure 2 illustrates chinkara distribution map. In environmental protection and management would be more practical in case data on species presence are expressed as a probability or proportion [6]. Thus, taking the 10% threshold into account, species presence or absence map was prepared using ArcGIS 9.2 software (Figure 3). As it can be seen, chinkara distribution at interface the two provinces of Isfahan and Yazd is wider than other areas in each province. In other words, the greatest dispersion occurred at the West and East of Isfahan and Yazd provinces respectively. This suggests that interface the two provinces of Isfahan and Yazd might serve as intermediate or corridors habitats for this species as well as current Asian cheetah habitat.

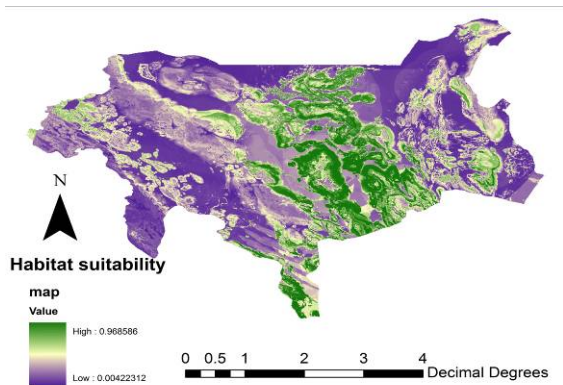


Fig 2: Habitat suitability map for chinkara (*Gazella bennettii*)

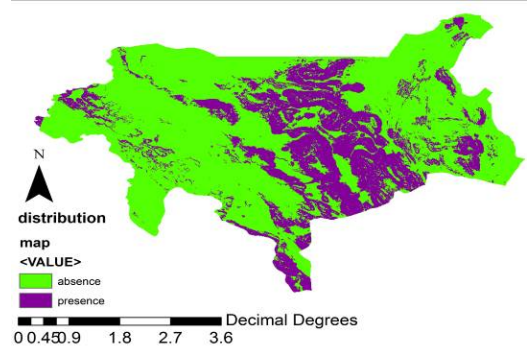


Fig 3: Chinkara distribution map (*Gazella bennettii*)

Model validation:

Curve obtained from model (figure4) indicates AUC for mean model running about 0.917. So it denotes to high efficiency of model [16]. MAXENT is satisfying in terms of efficiency evaluation based on AUC compared to most other presence data-based modeling [13]. Also, models are differed in selected thresholds. Both theoretical and experimental datasets imply that under low thresholds, MAXENT is a powerful model [21]. Threshold means value based which, prediction map for species presence probability may be convert to habitat suitability map.

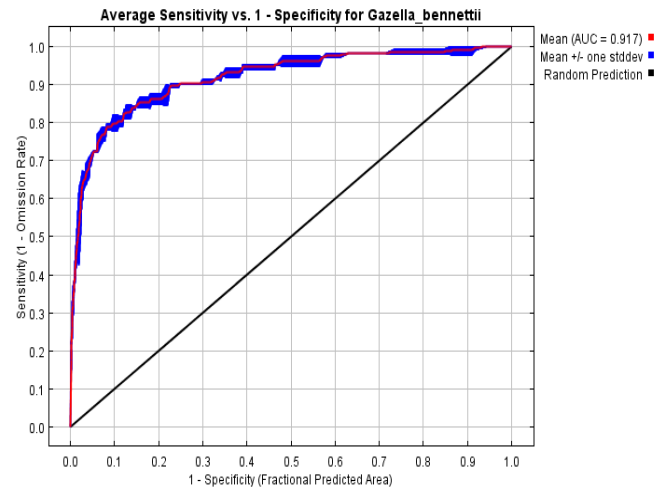


Fig 4: ROC curve for mean model running

Jackknife test:

Results from Jackknife test are shown in figure 5. The results of these tests are used to determine the significance of variables used in the model [17]. The blue bar represents the running model with individual variables and the green bar shows the status of individual variables in turn are eliminated and the effect of their absence in analysis determines their significance. Here, participation at quarter of cooler months, distance from railway and the slope percent had the greatest influence on model development. Because when run using

those variables, model had the highest AUC. Also, when the model parameters were removed from the analysis, the greatest reduction in AUC was occurred.

Of course, MAXENT at part of output, calculate Percent contribution of each variable during model running. According to this analysis, slope percent, seasonal participation, distance from railway, annual temperature range and seasonal participation accounted for the highest contributions in model running respectively. Apparently, results of principle component analysis, jackknife and contribution percent analysis do not confirm together. One of the reasons for not entering discrete variables into principal components analysis and Pearson correlation matrix. Since it is rational to such test conducted on continuous data. It should not be forgotten that although these analyses do not conform each other to one hundred percent, but they do not violate any other and the most important variables are relatively equal in all three methods and may differed slightly. It is advisable that the analysis is used so that it can evaluate both continuous and discrete at a simultaneously.

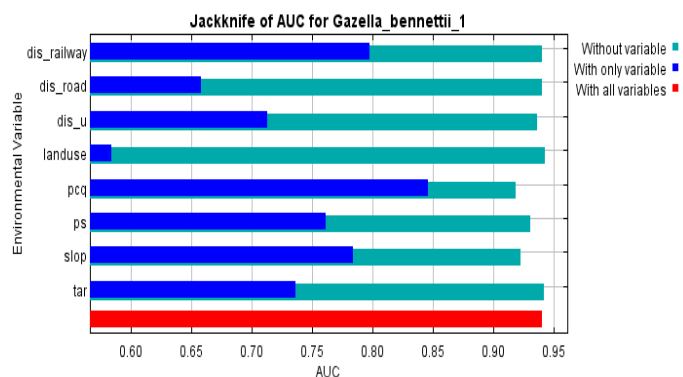


Fig5: Results of jackknife for variables

In the present study, participation at quarter of cooler months, distance from railway and the slope percent had the greatest influence on model development. Vegetation growth reflects participation importance. As for distance from railway, it can be note that chikara does not does to developed area. This is in line with findings of Dookia et al., (2009) [27]. In addition slope can be taken into account given to chinkara tendency to graze at plain. According to studies by Akbari & et al., [11] and Safian [24], chinkara prefers foothills than flat plains. To specify determinant variables and factors on species distribution play important role in accurate model prediction. It is therefore suggested that in order to select the best variables to find an analysis by which all discrete and continuous variables are evaluated simultaneously. According to Zamani [23], the distribution range of both Cheetah and chinkara are overlapped. Given nutrition values of chinkara for Cheetahs, and lack of conservational funds in Iran, it is recommends that to focus conservation and protections

activities on common distributed area while studying overlapping distribution both species.

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