



HEDONIC PRICE ANALYSIS OF CHICKEN MEAT CUT IN BAUCHI STATE, NIGERIA

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ABSTRACT

The study examined the Hedonic price analysis of chicken meat cut in Bauchi State, Nigeria. A multi-stage sampling procedure was used to select 586 households in the study area and data were collected through the use of structured questionnaire. The data were analysed using descriptive and inferential statistics. The results of the study revealed that most (96.9%) of the household heads were male and married (89.8%) with about 35.7% of them having secondary education and 30.0% take farming as their occupation. The study also revealed the mean age, mean household size and mean monthly household head income as 41 years, 8 person per household and ₦47,481.46, respectively. The results of the hedonic regression analysis revealed that, age of the household head, sex of chicken, types of chicken breed, marital status and market locations were the major factors influencing the price of chicken in the study area. The major constraints to chicken consumption were financial problem, high cost of chicken, health related problems, poor sanitary condition of meat vendors as well as high prices of other food items of necessities. It was therefore recommended that, federal/State governments should enhance economic boosting programmes to improve the income of consumers; there should be a concerted effort on the part of government and non-governmental bodies on measures of increasing animal feeds and feeding to boost animal production. More study also needs to be done on segmentation and differentiation of chicken meat cuts based on international standard.

Keywords: Attributes, Chicken, Hedonic, Meat cut, Price.

INTRODUCTION

There has been a significant increase in breeding and consumption of chicken globally, altogether with a potential positive effect on consumers' diet (health). The rise in chicken consumption has driven large attention among consumers, producers and suppliers and, has been reflected in the media more recently (The Guardian, 2018). According to the Organization of Economic Cooperation and Development (OECD, 2017), global consumption of chicken has grown 134 percent since 1990. The bird counts for 23 billion of the 30 billion land allocated to animals living in farms (Bennett *et al.*, 2018).

Intuitively, price is one of the main drivers of such an increase in consumption, as producers have been able to reduce average costs through methods such as selective breeding and as a consequence, reduce the price. Chickens are not only large in numbers, but have also grown in size. The average weight of a 56 days old chicken in 1957 was 0.9 kilograms, while in 2005 was 4.2 kilograms (Zuidhof *et al.*, 2014). Chicken appears to be the most consumed meat in the world.

Despite the increase in consumption, the quality of meat consumed remains of interest from a marketing perspective. Changing consumer demand has influence on the market for all types of meat, due to changes in attitudes toward diet and consciousness about healthy living



as studies have indicated relationship between some components of foods quantity-wise and some cancers and chronic diseases in humans (Baade *et al.*, 2012 and Youl, *et al.*, 2012). High demand creates challenges to meeting both the quantity and the quality of meat the consumer's need (Adetunji and Rauf, 2012). Most of the studies were focused on factors that influence consumer's demand without paying much attention to the quality attributes of chicken meat which are very essential in designing marketing strategies. This study, therefore, seeks to address these knowledge gaps by studying the preference of chicken using Hedonic price analysis in Bauchi State.

The broad objective of the study was to analyze the preference for chicken using Hedonic price in Bauchi State, Nigeria. The specific objectives were to:

- i) Describe the socio-economic characteristics of the chicken consumers in Bauchi State;
- ii) Determine the effects of attributes on price of chicken meat products; and
- iii) Describe the constraints associated with chicken consumption in the study area.

MATERIALS AND METHODS

The Study Area

The research was conducted in six local governments of Bauchi State, namely: Jamaare, Misau, Ningi, Toro, Azare and Bauchi, Bauchi State, Nigeria. The State comprises of 20 Local Government Areas (LGAs). According to the National Population Commission (NPC, 2006), the population of Bauchi State was 4,476,465 segregated to 2,426,215 males and 2,250,250 females. While according to the National Bureau of Statistics (NBS, 2014) with recent increase in the rate of population growth at 3.5% per annum as at 2019, the study area had a total population of 6,640,580, segregated to 3,445,225 males and 3,195,355 females and are mostly peasants. This large population of the state engages in crop, livestock and fisheries production amongst others either in mixed farming or specifics as their dependable occupation.

Sampling Procedure

A multi-stage sampling technique was used in the selection of respondents. The State was divided into 3 agricultural zones according to the Bauchi State Agricultural Development Programme (BSADP) classification (BSADP, 2010). Thirty percent (30%) of the Local Governments in each of the zones were selected. Thus, two (2) LGAs were randomly selected out of seven from western zone, one out of four in central zone and three out of nine from northern zone, making a total of six (6) LGAs from the whole State. From each of the selected local government areas, the local government headquarters were purposively selected based on the predominance of meat vendors. Thirdly, from each of the selected local government headquarters, 100 households were randomly selected making a sample size of 600 respondents for the study.

Method of Data Collection

Panel data were collected from 586 households out of 600 administered questionnaires recording a default of 14. The questionnaires were administered by well-trained enumerators. Information were collected on sex, marital status, age, household size, education level, occupation, and income of the household head, location, preference rating for the products.

Method of Data Analysis

The techniques for data analysis adopted included descriptive and inferential statistics. The appropriate functional form for hedonic method depends on the nature of the data used in the study. The predominant form used in the literature is the log-linear, but double-log is also used, as it facilitates the interpretation of results (Martínez-Garmendia, 2010 and Kim and Chung, 2011). To estimate Hedonic price analysis for chicken meat in the study a log-linear regression model was used.



i. Hedonic price model for live chicken can be specified as follows:
$$\ln Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + u \quad \dots(1)$$

where;

$\ln Y$ = Estimated price value of live chicken (₦)

X_1 = Sex

X_2 = Breed

X_3 = Household head income (₦)

X_4 = Age of the household head (years)

X_5 = Household size (Number)

X_6 = Level of education of the household head (dummy)

X_7 = Marital status (dummy)

X_8 = Occupation (dummy)

X_9 = Market locations (dummy)

b_1 ($I = 1 \dots 9$) are regression coefficients and direct measures of elasticity.

b_0 = Constant term of intercept

u = error term

ii. Hedonic price model for chicken meat cut can be specified as follows:

$$\ln Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + u \quad \dots(2)$$

where;

$\ln Y$ = Estimated price of chicken meat cut (₦)

X_1 = chicken cut (dummy variable)

X_2 = Appearance (dummy variable)

X_3 = Household monthly income (₦) Household size (Number)

X_4 = Level of education of the household head (dummy)

X_5 = Age of the household head (years)

X_6 = Household size (Number)

X_7 = Marital status (dummy)

X_8 = Occupation of household head (dummy)

X_9 = Market locations (dummy)

b_1 ($I = 1 \dots 9$) are regression coefficients and direct measures of elasticity.

b_0 = Constant term of intercept

u = error term.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Chicken Consumers

Table 1 shows the distribution of the respondents according to sex, marital status, educational level and occupation. The results showed that most (96.9%) of the household heads were male while 3.1% were female this is because male-headed households were higher than the proportion of female-headed households. This also suggests dominance of male gender as household heads in the study area. More so, the males dominate marketing due to the cultural factors that encourages them to go out to purchase material needs of the family (Akinleye, 2009).



Table 1: Respondents' sex, marital status, educational level and occupation distribution

Variable	Frequency	Percentage
Sex		
Male	568	96.9
Female	18	3.1
Total	586	100.0
Marital status		
Single	45	7.68
Married	526	89.76
Divorced	11	1.87
Widow	4	0.68
Total	586	100.00
Educational level		
Non- educated	41	7.00
Quranic education only	137	23.37
Adult literacy education	48	8.20
Primary education	44	7.50
Secondary education	209	35.66
Tertiary education	107	18.26
Total	586	100.0
Occupation		
Civil servant	142	24.23
Business	156	26.62
Farming	176	30.03
Artisans	93	15.87
Others(pensioners)	19	3.24
Market location	586	
Total	586	100.0

Source: Field Survey, 2016

These results agreed with the findings of Ogunwole *et al.* (2009); Akinwumi *et al.* (2011), Tsegay (2012), Yakaka and Bashir (2012), Toluwase and Kolapo (2017) who reported that there were more male participants in their studies on meat in Niger-Delta, Ibadan, Ogbomoso, Ethiopia, Borno and Ondo, respectively. The results of the marital status of the respondents revealed that, majority (89.76%) were married, 7.68% were single, 1.87% was divorced and 0.68% widowed. This agrees with the findings of Moses *et al.* (2015) who found that majority of the consumers who prefer fish in Yola North Local Government Area of Adamawa State were married; Toluwase and Kolapo (2017) also found that majority of chicken consumers in Ondo State were married and Mohammed *et al.* (2014). The Table 1also shows the distribution of respondents according to educational level. The result revealed that 7.0% of the respondents had no formal education, 23.37% had quranic education, 8.20% had adult education, 7.50% had primary education, and 35.66% had secondary education while 18.26% had tertiary Education. The findings showed that 35.66% of the respondents attended up to secondary school. This does not agree with the findings of Nnamdi (2010), Abdurrahman *et al.* (2013), Alimi, (2013), Toluwase and Kolapo (2016) who reported that majority of the respondents in their various studies had secondary education. The Table 1 further shows the distribution of respondents according to occupation. The result revealed that 30.03% were farmers, 26.62% were into business or trading, 24.23% of the respondents were civil servants, 15.87% were artisans and 3.24% falls within other jobs categories among others. This agrees with David *et al* (2015) and Gambo *et al.* (2010) that reported in their studies in Michika,



Adamawa State and Maiduguri Metropolitan, Borno State, Nigeria that the major occupation of the household heads was farming. This is because agriculture is the predominant activity in the Northern Nigeria

Analysis of Respondents' Age, Household Size, Household Income and Income Categories

Table 2 results show the distribution of respondents according to age, household size and household income. The results revealed the mean age, mean household size and mean household head income as 41years, 8 person per household and ₦47,481.46, respectively. The findings are in agreement with Nnamdi (2010) in his study on the determinants of consumers' preference for safe chicken consumption in Imo State, Nigeria who stated that majority of the respondents in his study had a mean age of 41 years and Moses *et al.* (2015) who studied the influence of socio-economic characteristics on consumer's preference on fish purchase in Yola North Local Government Area of Adamawa State whose findings revealed that majority of the consumers who prefer fish were between the ages of 41-50; most of them were female and majority were married.

Table 2: Respondents according to age, household size monthly income and income categories

Variables	N	Minimum	Maximum	Mean	Std. Dev
Age of household head	586	18.00	80.00	41.77	11.188
Household size	586	1.00	26.00	8.60	4.794
Household income	586	6,000.00	300,000.00	47,481.46	38355.165
Total	586	100			

Source: Field Survey, 2016

Household size had an important effect on the consumption pattern of food items. As the family size increases, there is tendency for the household to consume more food. The minimum number of 1 person and maximum of 26, with the mean number of 8people per household were recorded. The finding agrees with Umar and Hamidu (2007) and David *et al.* (2015) who in their various studies in Bauchi Metropolitan, Ogbomosho, Oyo State, Michika Local Government Area of Adamawa State and Bauchi State, Nigeria that found an average household size of 9 and 8 person per household. The findings are also in agreement with Nnamdi (2010) in his study on consumer's preference for safe chicken consumption in Imo State, Nigeria that found a household size of 9 people per household. The Table 2 further reveals that the minimum income of the household head in the study area was ₦6,000.00 per month and a maximum of ₦300, 000.00 with a mean monthly income of ₦47,481.46.

Prices of Chicken and Chicken Meat Cuts

Chickens are generally sold live and, in most cases, there are no standard of measurement, therefore, consumers in the study area use bargaining power to determine the prices of chicken. Table 3 shows the average prices of chicken and chicken meat cuts. The results reveal the minimum and maximum price of ₦500.00 and ₦1, 500.00 for the local cock, hen, and exotic breed of chicken in the study area. Mean price of ₦906.49, ₦805.50, ₦823.35 and ₦1, 162.80 were recorded for cock, hen, local and exotic breed of chicken, respectively.



Table 3: Average prices of live chicken and chicken meat cuts

Variables	N	Minimum	Maximum	Mean	Std. Dev
Cock	531	500.00	1,500.00	906.49	228.737
Hen	436	500.00	1,500.00	805.50	186.231
Local Breed	503	500.00	1,500.00	823.35	174.539
Exotic breed	453	500.00	1,500.00	1162.80	132.084
Chicken cut					
Breast	440	200.00	400.00	266.13	31.853
Thigh	423	150.00	300.00	210.28	22.188
Gizzard	400	30.00	200.00	101.85	15.529

Source: Field Survey, 2016

This goes contrary with the findings of Alimi (2013) who studied households' expenditure pattern on beef and chicken in Akoko South-West LGA of Ondo State, Nigeria that found an average price of chicken to be ₦700.00. Table 3 also indicated that the minimum price of chicken breast meat was ₦200.00 and maximum price of ₦400.00 with a mean price of ₦266.13, while thigh part price was found to be ₦150.00, ₦300.00 and ₦210.28 as its minimum, maximum and mean price in the study area. The minimum, maximum and mean price of gizzard was found to be ₦30.00, ₦200.00 and ₦101.85, respectively.

Preference Rating for Chicken in Relation to Selected Quality Attributes

Table 4 shows the distribution of respondents according to preferences of chicken based on a number of quality criteria such as breed, sex, type of bird, meat cut and appearance. The results showed that majority of respondents (75.0%) and (73.5%) preferred local and cock chicken, while 26.5% and 25.0% preferred hen and exotic chicken. The findings go contrary to the findings of Toluwase and Kolapo (2017) that chicken meat consumers consume more of imported chicken than the local chicken in the rural and urban household of Ondo State. The results further show that, majority (68.9%) of the consumers preferred breast meat cut of chicken followed by thigh parts of the chicken (25.8%). Most (94.0%) of the consumers also showed their strong preference for fresh appearance of chicken meat than dry appearance (5.8%). The forms of meat preparation differ from one another depending on the type of cooking and the spices used to package the desired form. Table 4 also revealed the commonly used methods of meat preparation in the study area. The results showed that majority (70.4%) of the respondents preferred chicken as pepper chick or pepper soup.



Table 4: Preference rating for chicken in relation to selected quality attributes (n = 586)

Quality attributes	*Frequency	Percentage
Sex		
Cock	427	73.5
Hen	154	26.5
Breed		
Local	435	75.0
Exotic	145	25.0
Meat cut		
Breast	393	68.9
Thigh	147	25.8
Gizzard	30	5.3
Forms of meat preparation		
Soup	86	14.7
Roasted	177	30.2
Pepper soup	437	74.6

*Multiple responses recorded

Source: Field Survey, 2016

Effect of Chicken Characteristics on Price

Table 5 shows the result of hedonic regression analysis on factors influencing the price of chicken. The result revealed that the coefficients of chicken sex (X_1) and chicken breed (X_2) were significant at 1% and 5%. The coefficient of chicken sex (X_1) was having a negative significant indicating that respondents in the study area were willing to pay significant lower prices on female chicken compared to male chicken, while the coefficient of chicken breed (X_2) was having a positive signs indicating that respondents were willing to pay significant higher prices on exotic chicken compared to local chicken. This is because exotic chickens were considered to have more meat in terms of quantity wise and the meat is less tender compared to local chicken. This result goes contrary to the findings of Kyarisiima *et al.* (2011) who found that 80% of chicken consumers in Uganda preferred local chicken meat to that of the modern poultry breeds because of taste. The result also showed that, the coefficients of marital status (X_7) was positive and significant at 10% indicating that married household heads were willing to pay significant higher prices on chicken compared to single or unmarried household heads. The result further showed that, the coefficient of other occupation in the category of occupation (X_8) was having a negative significant indicating that respondents with this category of occupation (e.g., pensioners) were willing to pay significant lower prices on chicken compared to civil servants. The findings in Table 5 also showed that, the coefficients of all the market locations (X_9) were negative and significant at 1% indicating that respondents in all the market locations were willing to pay significant lower prices on chicken compared to those in Jama'are. This is because they may likely not want to waste their time on dressing the chicken and hence may prefer taking them home for dressing. The estimated models were found to be poorly fitted and statistically significant at 1% judging by the R^2 value of 0.20 and F-values, indicating that about 20% of the variations is caused by changes in the variables used in the model, while the remaining 80% were accounted by other variables that were not included in the model.



Table 5: Factors influencing price of live chicken

Variable	Coefficient	Std. Err	T-value
Chick sex (X ₁)	-38.8242**	16.30794	-2.38
Chick breed (X ₂)	69.09963***	16.08778	4.3
Household head income (X ₃)	0.000411 ^{ns}	0.000258	1.6
Age of household head (X ₄)	-1.01683 ^{ns}	0.817006	-1.24
Household size (X ₅)	-0.07145 ^{ns}	1.859595	-0.04
Education level of household head (X₆)			
Quranic	-39.5498 ^{ns}	28.49352	-1.39
Adult-lit	-19.3861 ^{ns}	35.11592	-0.55
Primary	11.33846 ^{ns}	32.95507	0.34
Secondary	-38.6814 ^{ns}	29.78438	-1.3
Tertiary	-28.0569 ^{ns}	34.57895	-0.81
Marital status (X₇)			
Married	61.35405*	32.46989	1.89
Divorced	25.11982 ^{ns}	55.44963	0.45
Widowed	85.50448 ^{ns}	83.27523	1.03
Occupation of household head (X₈)			
Farming	-10.8778 ^{ns}	21.25098	-0.51
Business	-18.8229 ^{ns}	22.5207	-0.84
Artisan	6.834464 ^{ns}	25.34559	0.27
Others (pensioners)	-122.751***	44.77128	-2.74
Market location (X₉)			
Misau	-143.975***	25.73886	-5.59
Ningi	-181.811***	30.48717	-5.96
Toro	-122.007***	23.93714	-5.1
Bauchi	-71.3401***	22.53288	-3.17
Katagum	-153.356***	25.55926	-6
Constant	1095.324***	53.31311	20.55
F (22, 532)	6.29***		
Prob>F	0.000		
R-Squared	0.2064		
R-Squared adj	0.1736		
Root SME	148.94		
N	555		

Note: ns *p<.1; ** p<.05; *** p<.01; ns = Not significant ***significant at 1%, **significant at 5%, *significant at 10%.

Source: Field Survey, 2016

Effect of Chicken Characteristics on Price of Chicken Meat

Table 6 shows the results of hedonic regression analysis on factors influencing the price of chicken meat cut. The results revealed that the coefficient of gizzard in the category chicken meat cut (X₁) was negative and significant at 1%, indicating that consumers were willing to pay significant lower prices on gizzard compared to breast part of chicken because it has little



value in the face of consumers compared to breast part which is more tasty and nutritious. The result of the findings in Table 6 also showed that, the coefficient of business in the category of occupation was having a positive significant ($P > 0.05$), indicating that respondents with this category of occupation were willing to significantly pay higher prices on chicken meat cut compared to civil servants in the study area. This is because business people may have daily inflow of money compared to civil servants and therefore, may not be mindful of the high prices. The result of the findings also indicated that the coefficients of Katagum market location in the category of market location (X_9) was having a positive significant ($P > 0.01$), indicating that respondents in this location were willing to significantly pay higher prices on chicken meat cut because it is metropolitan area and therefore more economic activities are taking place this will make consumers (higher purchasing power) to pay for higher prices compared to Jama'are, while respondents in Misau, Ningi and Toro were likely to pay significant lower prices on chicken meat because it is cheaper in these locations compared to Jamaare. The reference point (Jama'are) of the analysis is the most rural of the remaining location which may have less supply of the animal products which may results in having higher prices compared to other location. The estimated models were found to be statistically significant at 1% judged by the R^2 value of 0.52 and F-values, indicating that about 52% of the variations is caused by changes in the variables used in the model, while the remaining 48% were accounted by other variables that were not included in the model.



Table 6: Factors influencing price of chicken meat cut

Variable	Coefficient	Std. Err	T-value
Chicken cut (X₁)			
Thigh	-1.41753 ^{ns}	2.409855	-0.59
Gizzard	-12.6673***	4.59546	-2.76
Meat appearance (X₂)			
Old/dry	-2.83387 ^{ns}	4.961147	-0.57
Watery	12.18021 ^{ns}	21.18436	0.57
Household monthly income (X ₃)	3.14E-05 ^{ns}	0.00004	0.79
Age of household head (X ₄)	0.049737 ^{ns}	0.128001	0.39
Household size (X ₅)	0.301462 ^{ns}	0.276039	1.09
Education level of household head (X₆)			
Quranic	-6.00315 ^{ns}	4.177346	-1.44
Adult-lit	2.737768 ^{ns}	5.194053	0.53
Primary	0.58 ^{ns}	4.804175	0.12
Secondary	3.248835 ^{ns}	4.443867	0.73
Tertiary	2.23487 ^{ns}	5.361518	0.42
Marital status (X₇)			
Married	-1.91574 ^{ns}	5.68674	-0.34
Divorced	-8.58554 ^{ns}	8.805059	-0.98
Widowed	-0.31578 ^{ns}	12.16099	-0.03
Occupation of household head (X₈)			
Farming	5.276169 ^{ns}	3.358315	1.57
Business	7.436174**	3.526697	2.11
Artisan	6.10462 ^{ns}	3.95621	1.54
Others (e.g., pensioners)	7.202241 ^{ns}	8.695098	0.83
Market location (X₉)			
Misau	-25.8917***	3.533931	-7.33
Ningi	-31.7992***	4.429697	-7.18
Toro	-27.6168***	3.342701	-8.26
Bauchi	31.13212 ^{ns}	21.40541	1.45
Katagum	28.5665***	3.760358	7.6
Constant	203.7737***	8.491358	24
F (24, 36)	20.39***		
Prob>F	0.000		
R-Squared	0.5289		
R-Squared adj	0.5029		
Root SME	20.919		
N	461		

Note: ns * p<.1; ** p<.05; *** p<.01; ns = Not significant ***significant at 1%, **significant at 5%, *significant at 10%.

Source: Field Survey, 2016



Constraints to Meat Consumption

This section investigates the constraints to consumption and preference of meat as reported by the respondents and the result is presented in Table 7. The results show that about 47% of the respondents reported financial problem, high cost of meat (31.05%), health related problem (11.60%) as the most severe constraints to consumption of meat. Other constraints identified by the respondents were poor sanitary condition of meat vendors (8.70%), high prices of other food items (4.77%), unavailability of the products (2.80%), long distance to market (1.53%), poor storage of meat (1.02%), large household size (0.85%) and cultural belief (0.51%) even though they are the least. The relative high percentage of problems of finance as reported by the consumers could be attributed to the fact that at the time of collecting data for this study the country economy was in deep recession which might possibly be responsible for having this figure because respondents admitted that the economic situation then was what prevented them from having meat in their diet.

The findings agreed with Moses *et al.* (2015) whose findings revealed that income, availability of fish and good storage facility were factors limiting consumers' preference for fish in Yola North local government area of Adamawa State, Akinwumi *et al.* (2011) who declared cost, availability and income as the most limiting factors of meat preferences and the findings of Yakubu *et al.* (2013) whose findings also revealed that majority of the fresh beef consumers in Sokoto perceived price and availability of fresh beef as their major constraints to beef preference.

Table 7: Constraints to meat consumption

Constraints	*Frequency	Percentage	Rank
Financial problems	274	46.75	1st
High cost of meat	182	31.05	2nd
Health related problem	68	11.60	3rd
Poor sanitary condition of meat vendors	51	8.70	4th
High prices of other food items	28	4.77	5th
Unavailability of the product	17	2.80	6th
Long distance to market	9	1.53	7th
Poor storage of meat	6	1.02	8th
Large household size	5	0.85	9th
Cultural belief	3	0.51	10th

*Multiple responses

Source: Field Survey, 2016

CONCLUSION AND RECOMMENDATIONS

It was evident from the findings of this study that the significant factors and attributes affecting price of chicken were meat colour, age of household head, chicken breed, sex and market locations. However, it was discovered that the constraints to meat consumption as ranked by the respondents were financial problem, high cost of meat, health related problems, poor sanitary condition of meat vendors and high prices of other food items. Based on the findings of this study it is therefore recommended that the Federal and State governments should come with programmes that will improve the income of consumers. There should be a concerted effort on the part of government and non-governmental bodies on measures of increasing animal feeds and feeding such as found in Cameroon and Ethiopia to boost animal production. This will be increasing the supply of animal products to the market and reduce the



high cost of the products. More study is needed on segmentation and differentiation of meat cuts based on international standard for export.

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