

CATTLE BONE AS JEWELRY MATERIAL

By

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DECLARATION

I hereby declare that I have, under supervision, undertaken the study herein submitted and that, to the best of our knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has made in the text.

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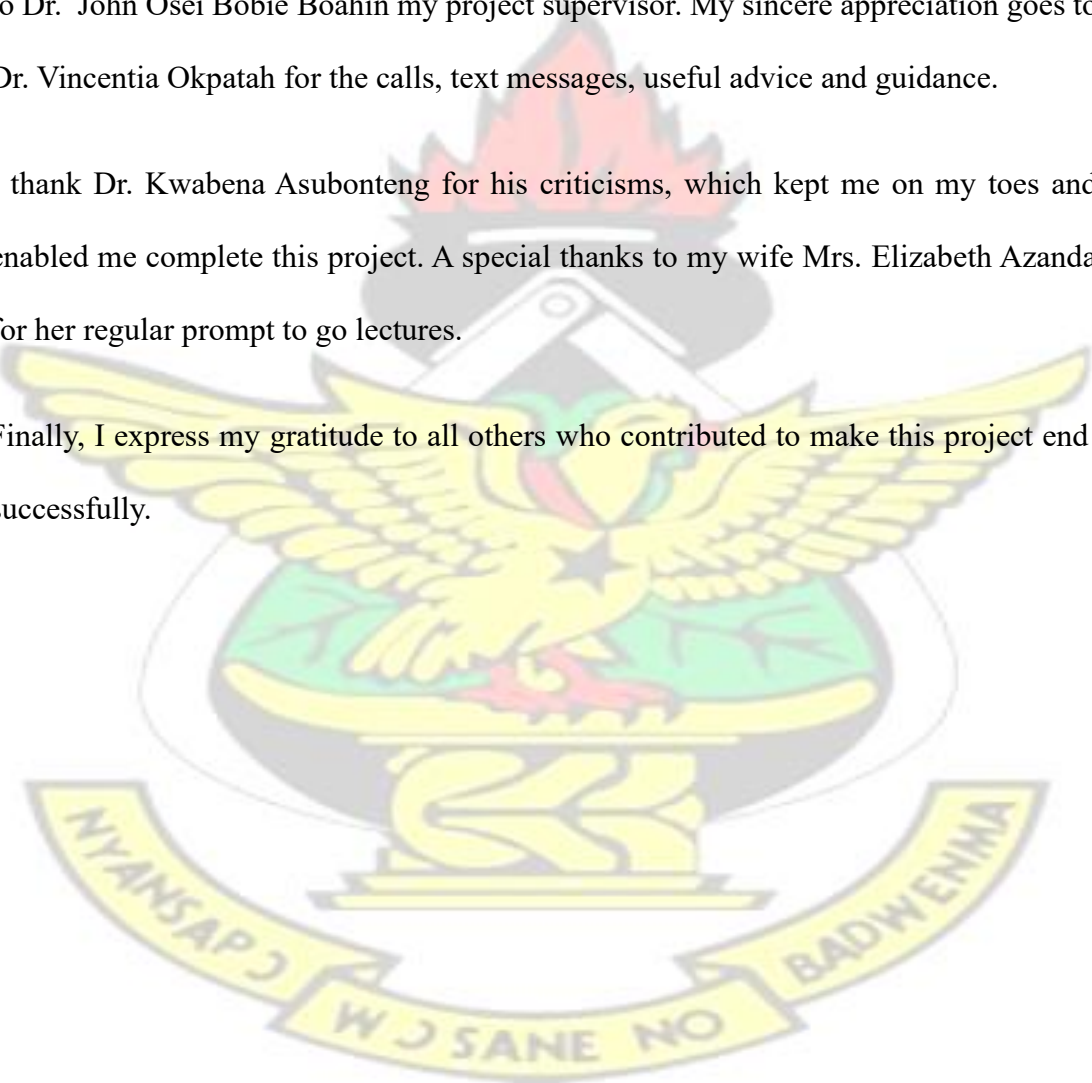
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ABSTRACT

The research explored and established what makes cattle bone as a jewelry material. The materials for producing jewelry are metal, wood, plastic, seeds, and shells. These materials may be havoc to unsustainable environmental pollutions. Conversely, cattle bone as waste in our environment in terms of properties bone is durable, shine, brittle, light in weight, can be dyed in an attractive creamy color which can be worn on the human body. Silver, gold, copper, bronze are metal materials which let people mine to get an income, but destruct our natural environment and pollute the water bodies, land degradation as a result of the building collapsing and aquatic poisoning. Also, cutting of trees to get wood results in forest degradation too a burden on government to pay. Plastic melts in order to produce earring also results in atmospheric pollution and burning of the artist at work as a health hazard to the entire environment. The researcher employed the qualitative research methods. The survey research method was used to explore the interest of the jewelry sellers and users and type of material for jewelry. An experimental method was used to understand the nature of cattle bone, select, create and test the prototype jewelry products. The researcher recommended the use of cattle bone for body jewelry as a form of waste for environmental sustainability and encouragement to Ghanaians and beyond.

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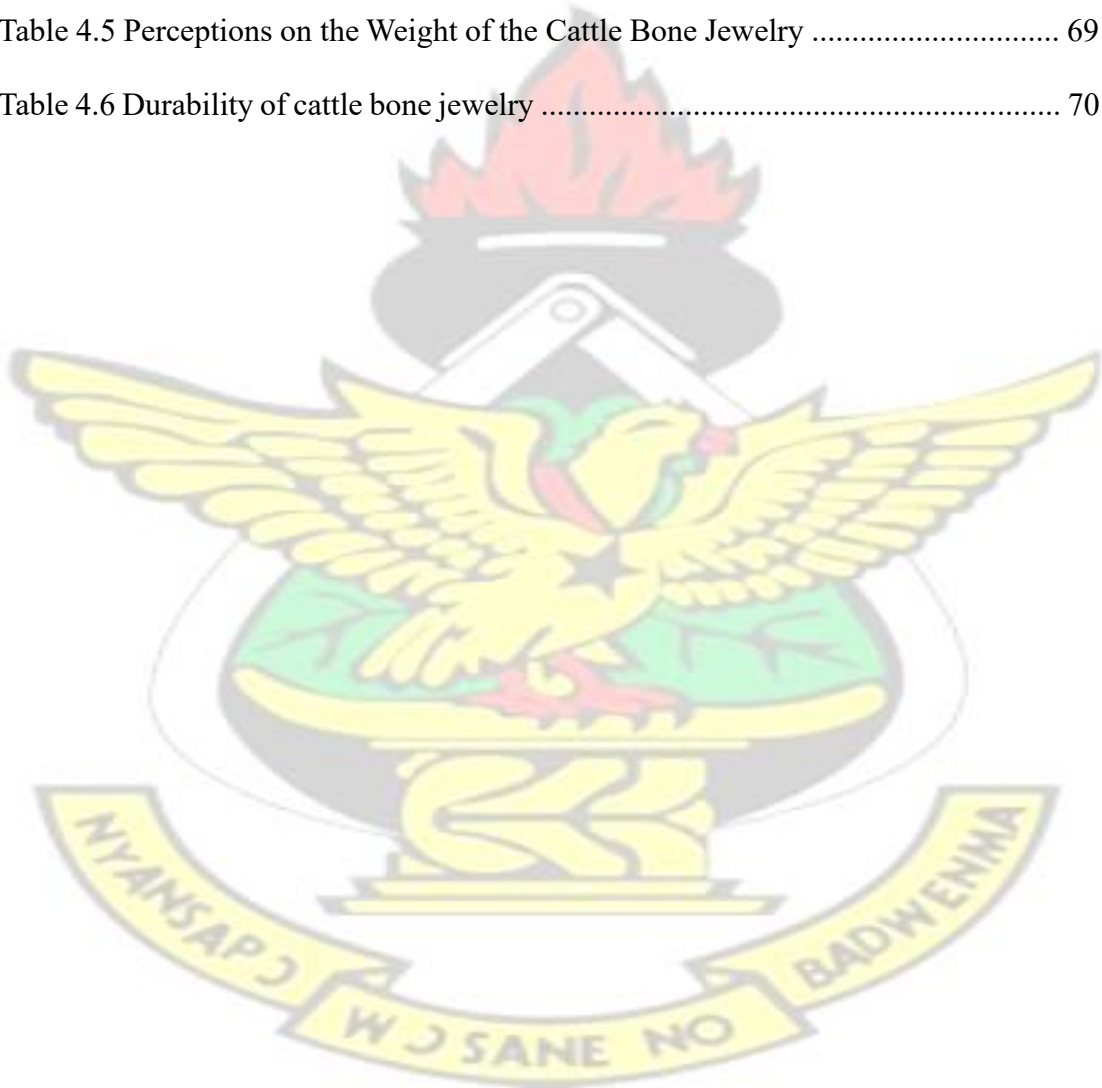
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CHAPTER ONE INTRODUCTION

1.1 Overview

This chapter deals with the background of the study, a statement of the problem, purpose of the study, research questions, objectives of the study, limitations, delimitations, definitions of terms, and organization of the chapters of the study.

1.2 Background to the Study

Early civilization began its development with usage of bone as an adornment and cult objects were made about 3,000 B.C. Archaeologists possessed data that even in the late Stone Age Mammoth and elephant tusks were straightened to make spades up to 2.5 feet long. Ivory was used to decorate the hilts. There is information that the throne of King Solomon was made from ivory and richly decorated with gold and gemstones. Specialists in Germany have uncovered new confirmation for Paleolithic music as the remaining parts of bone woodwind and separated little piece of three ivory woodwinds. The disclosure recommends musical convention was set up when current people colonized Europe more than 35000 timetable years back. No human bones have been found. The Evidence of musical instruments initially showed up around 32,000 years back in Europe, in this manner Paleolithic bone woodwinds and shrieks from different destinations in France range in age from 30,000 to 10,000 years of age by Doery (2013). The first run through ancient man bound a bone handle to a bit of stone with some ligaments; he understood the significance in this handle material. Bones, tusks, and prongs from living creatures memorialized the chase, may be customized and anointed his blade with the riches of his chasing endeavors. There are great illustrations of cutting ivory from as ahead of schedule as 2300 B.C.

Fisher (1996) remarks that, the convention of utilizing creature parts for his handles proceeded all through history, and proceeds with today, bone is a standout amongst the most vital parts regardless of an individual or the creatures aside from the capacity as bone. It can be utilized for making adornments; it formed lately, yet had been made in antiquated days for a long time. Bone adornments are innovative item for antiquated individuals. Bone jewelry design was used to identify the tribe of the artist, because it is said that only the people, who have right or wealth have the ability and right to wear bone jewelry, and bone jewelry is a symbol of wealth and status.

With heavy pollution of the environment, there is a need to pursue things from the natural environment without pollution as the duty of artists. So the natural animal bone jewelry, become a dominant material in jewelry creation, at the same time the bone can combine with other materials such as wood, leather, metal, hemp to make very beautiful jewelry. Bone carving existed all over the world, tribes in America, India and China have been awarded a special award in bone jewelry. In Africa, Kenya is the best bone carving country and the richest people in Kenya are bone carvers. The wearing of bone jewelry means peace and good luck for the wearers.

The gatherers of bone adornments additionally have their own particular support, for instance, dinosaur bone, and they are uncommon and make the bone gems of high cost. The high estimation of bone adornments, may lead individuals execute creatures with a specific end goal to get their bones for offering, it is illicit to do as such. Despite the fact that people like adornments, however, ought to get it through legitimate means.

Doery (2013) expressed that, Early Homo sapiens regularly possessed buckles or shake covers accessible. All the more as of late, particularly inside of the most recent 20,000 years, regular safe houses were upgraded with dividers or other basic changes. In open

territories, safe houses were built utilizing a scope of structural materials, including wooden posts and the bones of expansive creatures, for example, mammoths. These structures were presumably secured with creature covers up and the living ranges included flame hearths.

1.3 Statement of the Problem

The use of bone as a natural material for the production of jewelry and other artifacts seems not to be very common in recent times among Ghanaians and this situation is reflected in the number of people who practice bone carving as a vocation. In some few years back, there were quite a number of craftsmen who were carving ivory where the patronage of finished ivory products was good enough to keep the craftsmen in the business. However, with the declaration of elephants the primary source of raw ivory material as endangered species, ivory carving which was a flourishing business suffered. The craftsmen did not get involved in the carving of artifacts with other types of bones; this situation affected the industry negatively, customers were not used to artifacts carved with any other bones beside ivory and this affected the trade.

The wealth of bones in butcher houses, meat shops, icy stairs, and slash bars and the need to misuse accessible assets and also the craving to fulfill advanced social orders rage for natural items pass on extraordinary test for the restoration of the bone cutting industry. By method for advancing the scientist sees the need to focus on the generation of things that are regular and prove to be useful, such that however many individuals as could reasonably be expected can without much of a stretch get them for their utilization.

1.4 Purpose of the Study

The purpose of the study is to use cattle bone as a jewelry material for producing jewelry.

1.5 Objectives of the Study

1. To examine what makes cattle bone jewelry material.
2. To identify suitable jewelry that can be produced from cattle bone.
3. To produce earrings, pendants and rings from cattle bone.

1.6 Research Questions

1. What makes cattle bone a jewelry material?
2. What types of jewelry can be produced from cattle bone?
3. How can earrings, pendants and rings be produced from cattle bone?

1.7 Significance of the Study

The study will prevent hunters from illegal hunting for ivory and encourage bone carvers to use domestic cattle bone from abattoir, restaurants and chop bars.

The study will benefit Ghanaians, male and female, young and old as an employment opportunity. The study will be used by students and researchers as research material.

The study will help bone carvers as an aide and empower them to function admirably.

The government will generate income through taxes of bone carvers and bone jewelry sellers.

The study will help the matured as a health treatment when they resigned from dynamic administration.

1.8 Limitations

The researcher encountered series of limitations during the research programmed.

1. Most of the butchers were busy working and did not have time to attend to the researcher.
2. Some of the butchers did not respond to interview questions due to language barrier.
3. Some butchers do not respond to the phone call of the researcher because they consider them unknown.
4. Some butchers demanded money and charge the researcher a huge amount of money before responding to him.

1.9 Delimitations

The research based in Ghana, especially cattle rearing areas including the Northern Region of Ghana. The research content also based on cattle bone as a material for producing jewelry.

1.10 Definition of Terms

Marrow: A soft tissue in the middle of bones that creates red and white blood cells.

Compact Bone: The heaviest and hardest type of bone in the body.

Lining Cell: The flat cells that make up and cover the outer layer of bone.

Osteoclast: The cells in the body that break down bone material in order to reshape it.

Osteocyte: A star shaped bone cell with long branching arms that connect it to its neighboring cells.

Osteon: A tube shaped structure in bones with an open space for blood vessels, veins,

and nerves in the center.

Platelet: A small cell fragment without a nucleus that helps stop the flow of blood through bone when there is injured.

Spongy Bone: An inner layer of bone full of open sections for marrow, nerves, and blood vessels to move nutrients.

Cattle: Is a general plural term for more than one bovine whose gender cannot be determined, particularly viewed at a distance.

1.11 Organization of the Study

This study is organized into five chapters, one has already been outlined as the background of the study, a statement of the problem, purpose of the study, objectives, research question, and significance of the study, limitation, delimitation, and definition of terms.

Chapter two review the related literature of the study as the concept of curriculum and other definitions of the curriculum, explicit curriculum, implicit curriculum, nun curriculum, and extra curriculum of the study. Chapter three discusses the various research methods used in the study. Chapter four dealt with, data presentation, analysis, and discussions. Chapter five covers the conclusion of the study, summary and recommendation.

CHAPTER TWO REVIEW OF RELATED LITERATURE

2.1 Overview

This chapter contents the following, Review of related literature, The concept of the cattle bone as a material for jewelry, Historical overview of bone as creative material,

Bone a recreational material and entertainment, Utilitarian nature of bone, religious perception of bone, Anatomy of bone (skeletal system of bone). Number of bone cattle and suitable bones for carving, History on sources of bone, Expiring and deterioration period of bone, Empirical review of properties of bone, Empirical review of calcium carbonate presence in bone, Review of visual properties of bone, Empirical review of mechanical properties of bone, Distinction between bone and ivory, Aesthetic nature of bone, Selection of suitable jewelry for cattle bone material, Processing of bone material, Theoretical review of cattle bone, Preparation of bone material, Bone carving tool and uses.

There was no valid information available to the researcher because, the researcher realized that there was no study done on the topic at the University and so there was no information collected from the University. However, the researcher could not collect a data about the topic. This chapter is based on the review of the literature related to the study, is a patient to consider, it is necessary to explain the concept of cattle bone, historical overview, bone waste, theoretical review of cattle bone, anatomy of cattle bone, mechanical, physical, chemical properties of cattle bone, scarcity of choice in cattle bone as creative material, religious, medicinal, utilitarian, aesthetic nature of cattle bone and processing.

2.2 The Concept of Cattle Bone as a Jewelry material.

The ideologies and concept behind the cattle bone as a jewelry material was searched in depth attention in documentation such as books, journals, articles, published and unpublished thesis and on the internet.

Green by nature (2009) states that, waste, refuse, waste, garbage, junk, depending, on sort of material or the local phrasing, is undesirable or undesired material or substance.

It may comprise of the undesirable materials left over from an assembling procedure (mechanical, business, mining, rural operations) or from group and family unit exercises. The material may be disposed of or aggregated, put away, or treated (physically, artificially, or organically) preceding being tossed or reused. It is likewise used to depict something we utilized wastefully or improperly.

The free encyclopedia (2008), stated that "Muda" (Japanese term) which means vanity, pointlessness, absence of movement, pointlessness, waste, waste, inefficiency's and waste decrease is a helpful approach to build productivity. Basel () states that, waste are substances or items, which are discarded, or are planned to be discarded or are required to be discarded by the procurements of national law. An increase united country's measurements Division, expressed that, waste are materials that are not prime items (that is items for business sector) for which introductory client has no utilization regarding his/her own particular reason for creation, change or utilization, and of which he/she needs to arrange squanders may be created amid the extraction of crude materials, the handling of crude material into halfway last items, the utilization of conclusive items, and other human exercises residuals reused or reused at the spot of era are prohibited. From what is waste, or refuse, rubbish, garbage, junk, depending, on the kind of material or the province, phrasing, is an undesirable or undesired material or substance. It may comprise of the undesirable material left over from an assembling procedure (mechanical, business, mining or farming operations) or from group and family unit exercises.

The material may be disposed of or amassed, put away, treated physically, synthetically, or naturally preceding being tossed or reused. It is additionally used to depict something we utilize wastefully or improperly. Brussel (2004) concurred that, creature results are the parts of a butchered animal that are not straight forwardly.

Animal repercussions are the parts of a butchered animal that are not specifically devoured by people, including arrangement on ranch creatures and providing food waste (i.e. Waste nourishment beginning from eateries, cooking offices and kitchens) that contains or has been in contact with by items, whether cooked or uncooked items are utilized as a part of creating protein like meat and bone spear, certainties, gelatin, collagen, pet sustenance and other specialized items, for example, paste, cowhide, cleansers, compost, and so on. The option is there pulverization, the vast majority of by incineration Marison (2013) concurred that, creature butchered all are not straightforwardly devoured by people. This incorporates truth bones and gelatin.

By far most of this material is rendered or prepared to create a ground food called meat and bone dinner, which is utilized as a part of the development of animal nourishment to enhanced protein levels. Be that as it may, animal welfare affirmed measures forbid any nourishing animal repercussions to domesticated animals in view of the potential wellbeing dangers both people and creatures. Bone and Ivory are made of both inorganic (calcium phosphate, other take after minerals) and normal proteinaceous materials. There are two fundamental sorts of bone arrangement. The main sort is critical, additionally called lamellar bone, which is smoother and hard external overlay or surface layer of a bone. Lamellar bone, ordinarily acquired from long bones, is for the most part utilized for device making and cutting. Because of bones trademark permeable structure, cancellous bone is not utilized as a cutting material. Ivory is like a bone in synthetic make-up, yet it is made basically out of 1:3 collagen: hydroxyl apatite (dentine) contrasted with 1:2 collagen: hydroxyl apatite in bone. The concoction arrangement of teeth and tusks of warm blooded animals is the same paying little heed to the types of birthplace. Consequently, ivory, as portrayed in this aide, is any worked mammalian tooth or tusk opined by Schindelholz (2001).

Dandy (2013) remarked that, meat and bone dinner was some time ago utilized as a domesticated animal sustain. It was banned in light of the fact that it was thought to be accountable for the spread of cow-like spongiform encephalopathy (distraught dairy animal's illness.) Subsequently, billions of pounds of meat and bone supper were assigned as waste, adding to landfill flood.

2.3 Historical Overview of Bone as Creative Material

Throughout history bone was regarded as wealth and only the warriors, hunters, religious and royals possessed the bone items and as utility material, Choi (2013) commented that, McPherson what's more, his associates have found that Neanderthals made a particular sort of bone instrument beforehand just found in cutting edge people. These apparatuses are around 51,000 years of age, making them the most established known samples of such devices in Europe and originating before the known entry of present day people. Wikipedia, the free encyclopedia (2010) states that, The natural organics, horn incorporate bone, coral, ivory, seeds, (for example, Tagua nuts), animal shell, and wood. For the majority of mankind's history, pearls were a definitive, valuable pearl of characteristic natural origin as a result of their scarcity; the cutting edge pearl-refined procedure has made them significantly more regular. Amber and jet are likewise of characteristic natural inception albeit both are the aftereffect of incomplete fossilization.

Shindeldolz (2001) shown that, much of the time archeological ivory and bone in great condition can recognized by minute (10x amplification or more prominent) surface examination. Despite the fact that they have comparative chemical structures, bone and ivory have diverse cell systems.

Shindedolz (2001) again states that, Bone demonstrates a coarse grain with trademark lacunae, while ivory displays a progression of striations or small scale waterways, transmitting from the focal point of the tusk. These striations show up as cross-bring forth or motor turnings cross segment examination may be required for recognizing the two.

2.4 Bone as Recreational and Entertainment Material

America's Stone Age Explorers (2004) stated that, Bone Flute relic was utilized for playing music. The wind instrument made of bone dates to around 14,000 years prior in France, Hunters may have conveyed such woodwind like instruments in their portable tool boxes or been covered with them, maybe for life following death. Other creative relics of Stone Age people groups, particularly in the Old World, incorporate cut puppets, hollow works of art, and beaded attire. France's Solutrean society of 23,000 to 18,000 years ago is noted for its aesthetic custom.

Dandy (2013) concurred that, bones can be utilized to make woodwinds. Two Stone Age caverns, Geissenklösterle and Hohle Fels, have yielded such bone woodwind relics. Woodwind sections found at the Geissenklösterle date to around 35,000 years back, while the Hohle Fels woodwind date to around 4,000 years prior. The Hohle Fels woodwind was produced using the characteristic empty wing bone of a griffon vulture, while 30,000-year-old woodwinds found in Isturitz, France, were produced utilizing swan wing bone

2.5 Utilitarian Nature of Bone

This ancient rarity was utilized for sewing stows away. Stone Age innovation included sensitive sewing needles made of bone with punched eyeholes. They were most likely utilized as a part of pair with string molded from plant filaments or creature ligament.

Archeologists have found bone needles dating to within the past 20,000 years in Europe and North America, where they may have encouraged dress and vessel creation. A few societies made scoops from well evolved creature bone; the scoops have been frequently shoulder bones, or scapulae. The shoulder and pelvic bones of huge creatures were utilized by the Cherokee to make scoops.

Deer ligaments or calfskin straps connected the unresolved issues adheres three to four feet long. Ancient individuals likewise made scoops. Their scoops were produced using the complete shoulder bones of a pig, bull or deer, despite its tusk handles. In China, bone scoops could be created utilizing pig scapula bull scapulae. This apparatus was utilized for dispatching at creatures amid chasing. Bone shot focuses were adaptable, light, broadly useful weapons for chasing vast area creatures. To be as deadly as could be allowed, their tips were etched to lovely sharpness. This is a North American point, however, bone focuses hefted onto wooden or bone handles were likewise regular in the Stone Age Old World. A profound depression cuts into the base of the point, where a seeker would have embedded a wooden hurler and secured it with resin.

Dandy (2013) opined that, Bones can be utilized as a weapon as a part of the wild. Blades can be produced using the fragments of a deer crushed leg bone. The utilizations of such a blade are restricted; it is most appropriate for piercing.

Dandy (2013) remarked that, the Clovis individuals of ancient North America made woodwind, honed shots out of wood and bone. One has been found introduced in the rib of a male mastodon. No confirmation of bone improvement has been found around the Clovis point, which recommends that the mastodon went on not long after the ambush. The Apaches moreover made clubs from the jawbone of a stallion, elk, wild

bull or bear. The teeth were left in the jaw, and on occasion even cleaned for tasteful claim.

Dandy (2013) expressed that, a Biblical personality, Samson (a kind of Hercules of the Abrahamic religions) is said to have murdered one thousand men with the jawbone of an ass. Examples of the use of animal bone as a raw material from central and upper coastal sites attest to the skillful ability of coastal natives to adapt to available coastal resources. While there are known examples of similar uses of animal bone from the lower coast, a few are from excavated and well documented contexts. There are many bone tools and ornaments documented along the central and upper coast, including “ordinary” objects that are shared in common with inland sites, such as bone awls made from deer bone, flaking tools made from deer antler, and bird-bone beads. More telling are examples of bone objects that are rare or absent inland beyond the coastal zone by (Weinstein 2002).

Vigas (2011) believed that, the two stone devices produced using changed bones were found in Dikika, Ethiopia. The fossils propose early people were utilizing instruments approximately 3.4 million years back. From the first run through ancient man bound a bone handle with a touch of stone with some ligament; he comprehended the hugeness in this handle material. Bones, tusks, and horns of living animals memorialized the pursuit, possibly redid and anointed his sharp edge with the royal gems of his pursuing tries. There are extraordinary instances of cutting ivory from us in front of timetable as old Babylonia, 2300 B.C. The tradition of using animal parts for his handles continued all through history, and continues with today's emphasis by Fisher (1996).

Vigas (2012) believed, they uncovered two fossil bones bearing stone apparatus marks, One of the bone fit in with a huge Buffalo estimated, hooted warm blooded animal,

whiles one other was potentially from an Impala gazelle or pronghorn. Buckland (2011) states that, the use of bone building elements can be appreciated as an anticipation of climate variations.

Wienstern (2002) comments that, several different types of musical instruments made of bone occurred as grave goods at several cemetery sites along the upper coast. Examples include bird bone whistles and flutes, turtle shell rattles. Sean et al (2012) believed that, bone is an astounding characteristic material that is frequently utilized for a string nut and seats in musical instruments, and is likewise infrequently utilized beautifully for trim work.

Pearl, (2008) stated that, the bone has been used in jewelry making for thousands of years, but honestly, really where the bone comes from? One designer who does, who knows where his bone comes from, is Andrew Ross for raw material comes from an abattoir, his winning idea was to convert waste cow bone into a variety of objects including jewelry, as kinds of alternative uses of cattle bones rather than being regulated to the dump.

Buckland (2011) on the perspective, the roundabout house was comprised of 116 generous bones, including mammoth skull, jaws 14 tusks and leg bones. Given the shortage of stone in the Coastal Prairies and Marshlands it is nothing unexpected that the local tenants made numerous items out of creature bone as they made of shell. Animal bones were used to meet a range of needs including, but not limited to, formal and informal tools, musical instruments, and sacred talismans stated by Weinstein (2002).

Some bone closures are included in joint development. Where this happens the limit is secured with a slim layer of smooth ligament. This ligament is known as the articular

ligament, its capacity is to give a grating free surface to help development. Around the whole surface of the bone (with the exception of where there is articular ligament), is a dainty stringy layer called the periosteum. It is a connective tissue covering all bones of the body, and handling bone shaping possibilities. In grown-up creatures, it comprises of two layers being a system of thick connective tissue containing veins and a profound layer made out of all the more inexact organized collagens packs with shaft formed connective tissue cells and a system of slight versatile filaments. Bone-framing cells are situated here and are width of long bones. It additionally sets down an issue that remains to be worked out the width of long bones. It likewise sets down bone in light of recuperating at spots where cracks have happened.

Between the pole and furthest point is a circle of a ligament which is known as the epiphytial ligament osteoblasts (bone shaping cells) are situated in this plate and set down bone which makes the bone longer. This plate is just as dynamic in human and creature until the full grown size is coming to. After this, the circle solidifies. Around 33% of the bones comprise of sinewy tissues and cells which make a structure. Two third comprise of inorganic salts which are stored inside of the system to make the bone tissue hard. These salts are essentially calcium and phosphate, represents approximately 80% of salts stored home. Other salt incorporate calcium carbonate and magnesium phosphate.

Bone carving can result in intricate works of art, or they can be strikingly simple at a goal, a number of different bone carving tools are used.

Jake (2015) stated that, the bone structured, easily, they are harder and rougher on the outside than they have silky substance before the bone marrow. Cattle, oxen, moose, and deer are some of the more popular bones that are widely used, leg bones are

particularly desirable as they are thick and dense, making them less liable to crack. While not every bone carving tool will be used on every project, bone carvers usually arm themselves with a number of fundamental items.

Kuchelmenn et al (2005) comment that, Ice skates produced using bone is normal archeological finds from the Viking age. One of the better known cases is the pair found at Birka which most likely date from the ninth century. The bones were fixed to the base of the shoes utilizing cowhide thongs.

Kuchelmenn (2005) expressed that, the metatarsal bones of steeds or cows were utilized as a part of making skates. In individuals, the five metatarsal bones are the foot bones. In stallions, which basically stroll on their toes, just the third metatarsal bone grows completely, bringing about a since quite a while ago, rough bone.

2.6 Religious Perception of Bone

Every one of my bones should say, a master who is similar to unto thee, which conveyed the poor from him that is excessively solid for him yes, poor people and destitute from him that ruined him, palm35: 10-11 referred to by Taylor (2007). Animal bones were used to meet a range of needs including, but not limited to, formal and informal tools, musical instruments, and sacred talismans recounted by Weinstein (2002).

The most essential generally held conviction is that bones can revive. This conviction is particularly regular among individuals in Northern Eurasia also in parts of Asia and can be found in the myths of Germany, the Caucasus, Africa, South America, Oceania, and Australia. . Antiquated human advancements in Iran, Egypt,

Mesopotamia and Ugarit additionally had confidence in verification of bones by Taylor (2007). From the first run through ancient man bound a bone handle to a bit of stone with some ligament; he understood the significance in this handle material.

Bones, tusks, and horns from living creatures memorialized the chase, maybe customized and anointed his blade with the riches of his chasing endeavors. There are great illustrations of cutting ivory from as ahead of schedule as 2,300 B.C., the custom of utilizing creature parts for his handles proceeded all through history, and proceeds with today comments from Fisher (1996).

Dandy (2013) opined that, Bits of bones, whether from turtle plastrons or the scapulae of bulls or water buffalo, were used to divine the future in out of date China. After the bones or shells were cleaned of tissue scraps, the material was sawed, smoothed and cleaned to make level surfaces. Orderly segments of pits, which moved into number, were exhausted or scratched in part in. A glow source would then be associated with the pits until the bone split. The parts of the prophet bone were scrutinized to center the answer, yet how the answer was determined is not known.

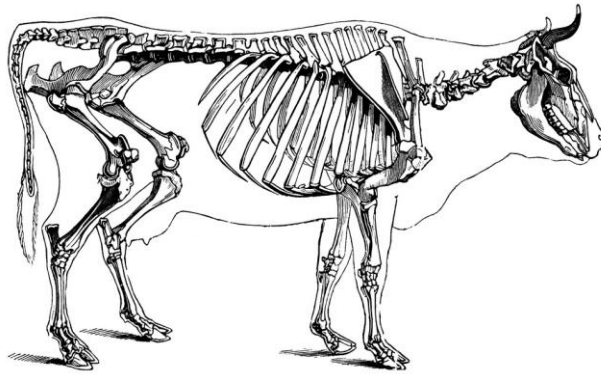
Dandy (2013) states that, while the expression "prophet's bones" is simply associated with scapulae or shells used as a piece of China, the demonstration of using scapulae to divine the future exists elsewhere. Specifically, scapulimancy has been penetrated in Japan, Korea, Europe, Africa and North America. The practice exists even today, among Greek and Serbian farmers.

2.7 Bone Innovative Material

According to Boyle (2011), this is not the first exertion at utilizing meat and bone feast as a renewable asset. In the U.K., where a large number of cows and sheep were

butchered in the previous decade on account of BSE and foot-and-mouth sickness, meat and bone feast is utilized to produce power.

2.8 Anatomy of Cattle Bone (Cattle Skeletal System)



(Small: 320 of 198) (Source; clipart etc) Goodrich, (1885)

2.9 Numbers and Types of Bones in Cattle

Karin (2009) agreed that, there are about 215 bones in cattle. Nicol (2011) states that, there are 6 long tubular bones of cattle, the upper bones are the equivalent of the thighbone in humans, the middle one is equivalent of shin bone. The lower one has no equivalence, it is very much shorter, and forms part of the foot. (Cattle walk on tiptoe) humerus femur, radius tibia, metacarpus, metatarsus. The English word is the thigh bone-thighbone, shin bone-shinbone; shank, bone-shinbone, metacarpus and metatarsus have no meat on them.

2.10 History about the Source of Cattle Bone

Buckland (2011) believed that, the Neanderlands hunted and slaughtered mammoths for meat before utilizing their bones additionally gathered a portion of the bones of creatures that had kicked the bucket of normal reasons.

Animal bones were easy to come by because coastal natives exploited many different critters from marine fish and reptiles to prairie grassland and riverine woodland artiodactyls (deer and bison) for food and leather, commented by Weinstein (2002).

Nicol (2011) states that, obtained of these butcher bones, received a femur. Depend on what you want to use the bone for. The most commonly used flat plaques are the tibia. It is triangular only at one end, and sort of rounded or oblong on another.

2.11 Expiration and Deterioration

It's been found that the rate, at which bone is corrupted, as showed by nitrogen loss, is subject to the protein content at any given time the rate at which nitrogen, and along these lines protein is lost. From bone is indigent to a stamped degree on the temperature at which this misfortune is happening. Another conclusion got from their investigation was that as the temperature rises, the disintegration of bone increments also Baxter (2004)

Utilizing comparisons depicted as a part of their article, the analysts found that bones kept 14.5 degrees Celsius as the mean temperature would lose 63% of their nitrogen content after 4600years stated by Endt et al (1984)cited by Baxter (2004)

Schiffer (2004) agreed that, Acidity and Soil pH levels the pH scale measures acidity to a size of 1 to 14. An estimation of 7 is thought to be unbiased, any underneath it to be acidic and any above it to be basic. The vast majority of the dirt found in antiquarianism range in the middle of 3.5 and 8.5 on the pH scale.

One wellspring of acidity is the emission from roots expressed Schiffer (1987). This can bring about there to be drawn on the bones because of direct contact with the root. The bone is more vulnerable to crumbling than ivory, in light of the fact that it has a

less crystalline structure, and experiences more compound and mechanical treatment while being revived amid handling, which catalyzes rot. 2, Chemical responses of ivory and bone are the same amid crumbling, on account of creation comparatively. 3, Acidic conditions will bring about the filtering of bone minerals, making bone lose quality and unbending nature.

Schindelholz (2001) stated, 4 Basic, conditions will make bone turn out to be more fragile and friable on the grounds that collagen and proteins will break down. 5, temperature fluctuation and dampness can bring about splitting and distorting of bone.

2.12 General Properties of Bone

Shriver (2012) stated that, Bone is living, creating tissue. It is fundamentally made of collagen, a protein that gives a fragile framework, and calcium phosphate, a mineral that incorporates quality and hardens the structure.

2.12.1 Empirical Review of Chemical Properties of Bone

Shindelholz (2001) believed that, there is no basic test accessible that one can utilize effectively to distinguish bone; in any case, calcium carbonate in bone can be recognized utilizing test.

2.12.2 Empirical Review of Calcium Carbonate Presence in Bone, Theory and Equipment

Shindelholz (2001) remarked that, this is performed by setting a drop of corrosive straightforwardly onto test bone, remembering that corrosive will scratch the bone and cause setting and permeable. For the reason, an unnoticeable spot ought to be decided for testing.

Shindelholz (2001) emphasis that, Calcium carbonate is broken up by corrosive to create noticeable fizz of carbon dioxide. Breaking down of calcium carbonate with

sulfuric corrosive is: $\text{CaCO}_3 (\text{g}) + \text{H}_2\text{SO} (\text{aq}) - \text{Ca}_2 (\text{aq}) + \text{H}_2\text{O} (1) + \text{CO}_2 (\text{E})$. Dishes, Any solid corrosive, for example, Nitric, hydrochloric, or sulfuric corrosive, deionized water, glove and goggles.

Sean et al (2012) states that, bone involves an inorganic grid of hydroxyl apatite ($\text{CaCO} (\text{PO}_4) 6\text{COH})_2$ which gives mass and hardness, and an inorganic network of basic protein, for example, Collagen that loan quality and adaptability.

Shriver (2012) contends that, Osteoporosis, or permeable bone, is an ailment described by low bone mass and auxiliary disintegration of bone tissue, prompting bone delicacy and an expanded danger of the breaks of the hip, spine, and wrist.

Fisher (1996) agreed that, creature Bone is a greater number of permeable than ivory.

Bone has constantly been a staple on handling plant breaking down, cutting edges, and has sensible wear properties. It can be jigged (cut in a repeating case) to augmentation material rubbing and construct visual pastime. Bone takes hues well, and can be offset. It is all things considered not considered a high regard handle material. Various sorts of bone may be used, routinely surely understood are including ox-like and giraffe bone. The primary unending procedure for advancement and use for a fine custom edge is to have the bone professionally offset.

2.12.3 Empirical Review of Visual Properties of Bone.

Bella (2011) in the view that, a large cow you can get a piece may be 15-18, 20mm across, in a shape letter D. The flat and slightly rounded walls, thinner than the tibia walls and narrower. Metatarsus and metacarpus, Metacarpus (the front one) has a cross-section of the letter D. It can be used but has no advantage over equivalent pieces of more readily obtainable bones. Metatarsus is squares“ on the outside, with a round hole in the middle, and has rather thick in the middle like up to 14-15mm thick in the middle.

Spongy calcareous structure-made out of huge and sporadic pores, which is normal for cortical bone.

Dyed white calcite bone results from greatly high temperature being come to, for example, the warmth required for cremation. Moment pits or anomalies on surfacetrenches for vein and nerve entry in lamellar bone. 10x or more noteworthy amplification from a hand lens or magnifying lens will be a guide in perception of these elements. Dark or Brown staining so as to shade brought about from anaerobic peat pig conditions, in spite of the fact that an assortment of hues can emerge from recolouring by diverse encompassing stores.

Schindelholz (2001) expressed that, the first problem with bone is that, to some degree permeable, and this impacts security made bone lesser and more prominent degrees of porosity, and that helps with incredible choices to handle applications. Being porous and common, bone materials absorb and free clamminess, hold contaminants, salts, and soil. Extra thought must take to keep the handle material, impeccable and dry. Sudden changes in relative clamminess (like moving from a sodden forested environment to a dry circulated air through and cooled room) can achieve such an assortment in suddenness content that the material specialists and breaks a long way from fortifies, secures, or sticks within hours described by Fisher (1996).

2.12.4 Empirical Review of Mechanical Properties of Bone

Chen et al (2008) states that, examination of the structure and mechanical properties of cow-like femur and prong of the North American elk, horn and appendage bone have a comparable microstructure and compound synthesis, both are basically made out of sort collagen and mineral stage (carbonate apatite), organized in osteon in reduced (cortical tone) areas and a lamellar structure in the cancels (supple or trabecular bone) segments.

Baxter (2004) on the perspective that, the mineral substance is lower in tusk bone and it has a center cancellous bone encompassed by smaller bone going through the fundamental bar and tines. The mineral substance is higher in the minimal of dairy animals as contrasted and the cancellous bone, in spite of the fact that there is no distinction in proportion of the mineral components with calcium. Mechanical test (curve and examination) on longitudinal, transverse introductions of dry and rehydrated reduced bone of North American elk (*Cervus canadensis*) prongs are contrasted and referred to information on other tusk and additionally ox-like femora. Both dry and rehydrated bones are exceptionally anisotropic, with the bowing and compressive quality and flexible modulus in the middle of dry and rehydrated tests tried in the transverse bearing. The versatile modulus measured from the bowing tests is contrasted and composite models. The flexible modulus and curve qualities are lower in the rehydrated condition, yet the strain of disappointment and break durability is much higher contrasted and dry specimens.

All antler bone mechanical properties are lower than that of bovine femora. The antler has a much high fracture toughness compared with bovine femora, which carots with their main function in transpacific combat are a high impact resistant, energy absorbing material. A model of compression deformation is proposed, which is based on oseonsliding during shedding.

2.13 Distinction between Bone and Ivory.

Shindeldolz (2001) comments that, much of the time archeological ivory and bone in great condition can be recognized by tiny (10x amplification or more noteworthy) surface examination. Despite the fact that they have comparative chemical syntheses, bone and ivory have diverse cell systems. Bone demonstrates a coarse grain with trademark

lacunae, while ivory shows a progression of striations or miniaturized scale trenches, transmitting from the focal point of the tusk. These striations show up as cross-bring forth or motor turnings cross segment examination may be required for recognizing the two.

2.14 Aesthetic Nature of Bone

Normally, the decision to utilize horn, bone, or ivory is one of tradition. The greater part of us grew up passing on jigged bone dealt with collapsing blades by Fisher (1996). Stubble (2014) affirms that, Bones, horns, and hooves likewise supply critical by-items. These incorporate catches, bone china, piano keys, pastes, compost, and gelatin for photographic film, paper, wallpaper, sandpaper, brushes, toothbrushes, and violin string. The choice to use horn, bone, shell, or ivory is moreover one of greatness. Nothing looks like a touch of a stag, wrinkled and upsetting. New elephant ivory is an incredibly solid, smooth shading, suitable for engraving, cutting, or scrimshaw. Mammoth ivory can have amazing illustrations in rich tans, reds, and even soul. The conditions of various prongs and horns left in the round credit themselves to handles, the structures compliments sharp edges and here and there cutting edge stands and fittings, bone has smooth shading and imperceptibly white and a smooth sparkling finish elucidated by Fisher (1996).

The surface of an extensive part of these materials upgrades hold quality. Various horns, bones, and ivories get the opportunity to be sticky when wet, henceforth improving hold security when working. The arrangement adds visual interest and separation to a smooth and cleaned front line. The piece of a fine normal material makes a move between the cool, inorganic steel front line to the living, warm, moving hand. The cleaned surface

of ivory has a smooth, pleasing feel, jigged bone is engaging and secure in the hand elucidated Fisher (1996).

Wisker (2014) noticed that, Bones, horns, and hooves additionally supply essential by-items. These incorporate catches, bone china, piano keys, pastes, manure, and gelatin for photographic film, paper, wallpaper, sandpaper, brushes, toothbrushes, and violin string.

Bone burn, which is utilized to process sugar, is produced using the bones of dairy cattle from Afghanistan, Argentina, India, and Pakistan. The bones are sold to dealers in Scotland, Egypt, and Brazil who then offer them back to the U.S. sugar industry.

Dandy (2013) remarked that, outside of being changed into a pooch toy, bones don't seem, by all accounts, to be extraordinarily significant outside the body. Regardless, bones were significantly more supportive certainly. Before the improvement of plastics, bones were a run of the mill material for gadgets and things. For sure, even now, bones may mixed with their present day accomplices in things.

So next time you hold the bone of a drumstick, you might need to remember the accompanying exchange employments.

As indicated by Dandy (2013), bone feast was first generally utilized as a manure as a part of the mid-nineteenth century. In spots, for example, Abilene, Texas, wild ox bones was gathered and utilized for manure. Before 1900, the buffalo bone industry was supplanted by cow bones. Today, the bones of bovines, and pigs and sheep, are most by and large used for bone dinner. Bone supper is ground into two sorts: a coarse drudgery and a fine smash. Better smashes release supplements into the soil speedier. As bone

dining experience is rich in calcium and phosphorus, yet insufficient in nitrogen, plant masters may add nitrogen-rich compost to modify the application.

Dandy (2013) expressed that, Fossils were uncovered in China much sooner than fossils importance as the remaining parts of ancient creatures was known and called "mythical beast bones" they were ground and expended as treatment for an assortment of afflictions, for example, wooziness, leg spasms, and looseness of the bowels, inward swellings, and intestinal sickness. While the damaging practice is a baffling marvel for scientists, local people's learning of fossil troves demonstrates significant for exhuming.

Dandy (2013) concurred that, During the Upper Paleolithic in Europe, woolly mammoths gave cover as their tremendous bones. The bones used for homes were long and level, tusks, or joined vertebrae, and were frequently lashed together or installed in the soil. That the Neanderthals manufactured these refuges prescribes they are more splendid than they are conspicuously depicted.

Dandy (2013) elucidated that, Button-like articles made of bone or diverse materials have been found in archeological areas. These articles may do a reversal as far back as 2000 BCE. Verification suggests these catches like articles were not used as fasteners, as bleeding edge gets may be. In Paris in the thirteenth century, social orders of catch makers made gets from a combination of materials, including bone. In the fourteenth century, gets were typically made of bone or wood. Old bone gets are discernable from front line gets by their more noticeable weight, dry feel, and fairly variable size.

These articles from time long past times finds were created utilizing the shin bones of bovines. Meat and bone dining experience was some time back used as a trained creature reinforce. It was banned in light of the fact that it was thought to be accountable for the spread of dairy animals like spongiform encephalopathy (distracted cow-like

sickness.) Consequently, billions of pounds of meat and bone dinner Boyle (2011) demonstrate that, Fehme Vatansever and his partners at Clemson University responded by arranging a plastic, in perspective of meat and bone supper. The rough material was mixed with ultra-high-sub-nuclear weight polyethylene (UHMWPE), a great material used as a piece of skis, snowboards and substitution joints. The ensuing composite is just about as solid as UHMWPE. It is for the most part biodegradable, uses less petroleum than flawless UHMWPE, and makes a usage out of a substance that would somehow be possessed to landfills, were appointed as waste, adding to landfill surge.

Boyle (2011) states that, Future without petroleum plastic could be produced using the ground-up bone and meat parts left over from the creature rendering procedure. Despite the fact that it's not precisely vegetarian well disposed, it's not subject to fossil fuel, and it's maybe less terrible than tossing the majority of this offal into landfills, which is the thing that happens to most meat and bone dinner, since it has been banned as animal food.

Boyle (2011) expressed that, But the American meat industry still creates around 9 billion pounds of protein feast each year, the greater part of which is meat and bone dinner. Bone feast independent from anyone else is transformed into greenery enclosure compost; however, without across the board use for meat and bone dinner, it's dumped into uncommon landfills, as per ACS. It is treated with chemicals to keep the spread of prions connected with BSE.

2.15 Selection of Jewelry suitable for Cattle Bone Material

The Free Dictionary (2015) defines that, the earring is an ornament worn on or swinging from the ear, particularly the flap adornment embellishing another piece of the body.

Bill (), states that, Ball studs that are ball-formed, sizes and organization change. Bar –rectangular, stationary studs that may or may drop beneath the ear cartilage (i.e. Do not to move like dangle earrings) length changes. Catch studs are that don't dangle, are now and then alluded to as button earrings, And his term can also refer to the shape of the main stone, pearl or design, round and somewhat flattened. Chandelier – an earring with a dangle that is suspended from the post and looks somewhat like a chandelier. Clip-on; not for pierced ears, these earrings are attached to the earlobe by means of a hinged clip on the back of the earrings. Cluster; cluster- earrings are decorative earrings composed of gemstone and, or beads, glass and metal, grouped together in clusters. Creole or Shrimp an oval- to-round hooped earrings broader at the bottom at the top, popular since 1850s.

Dangle or drop; earrings that fall below the earlobe, usually suspended by a wire or chain from the post. Ear pinning (likewise ear trims) a bended ear-gems piece with a wire cut on its back that can wear on both piece is turned up to rest in the helix of the ear, with the wire cut behind the ear, holding the pin against the ear, for non-pierced ears, the back wire slides onto the back of the ear cartilage, occasion the pin against the ear, though for this situation the pin could without much of a stretch be lost.

Pivoted studs that spread a section at a catch pivot and fit properly with a snap back „under“ „earring closure“.

Hoop; metal tube earring framed fit as a shape of a circle charm may be swung from the band half bands are C-molded, half-circle loop hoops. The band let or Earrings fascinate; A little appeal like beautification a little circle or focal gap, permitting it to dangle from a loop stud. Hughe; a hoops (as a rule pivoted) for a pierced ear in which the setting nearly "embraces" the ear cartilage, concealing the stud post, Wkikipedia answer (2010) states that, Jewelry is enhancement, for example, pins, rings, neckbands,

studs, and wrist trinkets with a few special cases, for example, watches, stud is an adornment for the ear, generally cut onto the flap or attached through, opening pieced in the projection.

Another definition Says that hoops is a decoration worn or swinging from the flap of, the third definition says that studs is an individual trimming worn pendent from the ear, typically suspended by method for a ring or snare going through a pieced gap in the flap of the ear or, in present day times, regularly by method for a screwed cut on the lope. With the reason to brighten or to alter the presence of the ear is by all accounts verging on all inclusive. When all is said in done, use seems to call for wearing hoops in matches, the two decorations in all regards looking like one another; yet a solitary stud has at times been worn.

2.16 Processing of Bone Material

Mucalo (2010) states that, Basically, take the material from the femur bone of the dairy animals, known as the condyle, it's the enormous, immense bone, which bolsters the mammoth, and afterward slash it out, and run away with the supple bone, the cancellers bone in the centre, and cleave that with a hack saw, when done, essentially left with a considerable measure of violence, and need to heat up that out, and that is done at around 100 degrees Celsius with water in a weight cooker, over around 6 to 12 hours, then take it out, dry it out, and after that it is put in a suppressor heater.

This is a heater which can warm up to 1,000 degrees Celsius, and that dissipates or shoulders of all the natural stuff in the bone. What's more, what is left with is a mineral shell of hydroxyl apatite, the calcium phosphate in the bone, take that material, can make shapes out in the event that it, cleave it into blocks or barrels, and afterward can utilize it as is and wash it a short time later to uproot any by items, and further medicines

with it, can take this bone and crush it and essentially make a powder, and after that can go it through a splashing mechanical assembly. It comprises of a plasma light which is high temperature kind of plasma, which is similar to another condition of matter and go the particles through this high temperature light, halfway softens, are kind of flung against a surface that need to cut.

Structure splats, develop, make a decent harsh surface of this hydroxyl apatite, and that is known as a plasma covering, and that is the manner by which treats inserts to enhance biocompatibility – so how all around incorporated by the body. It is entirely unpleasant material. At the point when take a gander at under a high amplification magnifying instrument, an electronic magnifying instrument, looks really convoluted and really harsh and permeable, however, that is useful for the body in light of the fact that it helps tissues and cells to kind of attack and colonize the material

2.17 Theoretical Review of Cattle Bone

Blay (2009) indicated that, making beads, most modern bone beads come from cows, sheep, or even camels and yaks. From the statements of Pearl (2008), bone has been used in jewelry making for thousands of years, but quite honestly, really where the bone comes from? One designer who does, who knows where his bone comes from, is Andrew Ross for raw material comes from an abattoir, his winning idea was to convert waste cow bone into a variety of objects including jewelry, as alternative uses of cow bones rather than being regulated to the dump by Fisher (1996).

Wisker (2014) trusted that, Bones, horns, and hooves moreover supply basic bythings. These fuse gets, bone china, piano keys, glues, manure, and gelatin for photographic film paper, wallpaper, sandpaper, brushes, toothbrushes, and violin string.

The Eskimo Gallery (2013) accounts that, since the Inuit lived off the area, the majority of their utensils, apparatuses and weapons were made by hand from common materials: stone, bone, ivory, horn, and creature stows away. A traveling individuals could bring almost no else with them other than the devices of their everyday living; then again, other non-utilitarian articles were additionally cut in scaled down so that could be born or worn, for example, fragile studs, move veils, special necklaces, fixation figures, and many-sided brushes and figures. The free reference book (2010) trusts that, Beads are still produced using numerous normally happening materials, both natural, creature bone-or plant-based roots.

2.18 Preparation of Bone Material

Nicol (2011) states that, assuming cutting off the two ends about where the spongy bone begins. That is left with the very most 1/3 of the total length, being a tube with marrow, clearly showing at the two ends. The tibia has one fairly flat, long surface running along one side, on the opposite side the first half of the bone (segment) it is also reasonably flat (slightly rounded, but still usable for plagues) then become triangular, from which part can cut two flat, short pieces of big enough for fishhook each, the femur is tubular with a round cross-section.

They can be put on the lathe, and made into a turned item. They were extensively used in the fatter parts of turned chess pieces. (Chess pieces) were all assembled from bits, even most ivory ones, to save material radius (which is always partly fused with a much thinner bone, ulna this has to split from the radius during cleaning) has an oval cross-section, with rather solid edge on the opposite to the ulna.

This can be used in the round carving of small items. This is also the part that was used in chess pieces for the spindly, thin turned bits, like the pawn upper parts. In a large

cow, can get a piece may be 15-18, 20mm across, in a shape letter D. The flat and slightly rounded walls, thinner than the tibia walls and narrower. Metatarsus and metacarpus, Metacarpus (the front one) has a cross-section of the letter D. It can be used but has no advantage over equivalent pieces of more readily obtainable bones.

Metatarsus is squares" on the outside, with a round hole in the middle, and has rather thick in the middle like up to 14-15mm thick in the middle. Cutting the hooves off, skinning and cleaning with worth the effort, also the most trying to impregnate the bone.

2.19 Bone Carving Tools and their Uses

According to Nicol (2011) the hacksaw is needed for cutting the bone down to size and can be used in larger pieces for cutting into details into the bone. Coping or fret saws are the best type of saw to use, as both can be manipulated to see around bends and curves. Coping and fret saws are similar, as both have a handle attached to the U - shaped frame that hold the blade in place, but coping saws are a bit longer and larger.

Drilling, a drill or Dremel tool with a small drill bit attachment is needed to drill any holes through the bone. Holes are necessary for bone pieces that will become earrings or other jewelry. Drill can also be used to carve deeper patterns than a saw can without drilling all ways through the bone.

Graving, the gravers are chisels created out of top quality steel. These are used for cutting out designs that are very fine, requiring more control and precision than a saw can provide. Smoothing, files and sandpaper are needed metal files are used to smooth down jagged edges. Bone carvers may use a number of diverse size files, subject to the size of their piece with the ideal files being very coarse. Fine files will not have the strength to properly smooth down the bone. Needle files which feature, a slim body that often tapers to a point, are useful for very fine details. Sandpaper is used to further

smooth down jagged edges that may still remain after filling. It also works to erase any grooves marking left from any of the tools.

Depending on the smoothness desired, sandpaper can be used both dry and wet. Polishing tools is optional, but adds a fine shine to the finished product. A polishing head can be attached to Dremel tool or other grinding tool. The best polishing head for bone is a building wheel made of cotton. Using a polish with the wheel made is also optional. Silver and brass Polish work, but both must be washed off after use. Safety at work, since bone fragments can snap, break or cause dust, carvers should invest in at least the basic safety equipment. Goggles are a must for keeping fragment and dust out of the eyes. A mask over the nose and mouth keeps dust from being inhaled.



CHAPTER THREE METHODOLOGY

3.1 Overview

This chapter in the project report deals with how the research is conducted as well as various research methods, such as sampling procedure, explains and describes the research instrument used; it explains the research methods and procedures for data analysis and interpretation.

3.2 Research Design

Exploration outline is the reasonable structure in which research was directed. The exploration's capacity is to give, the important data with insignificant consumption, exertion, time and cash. The examination outline utilized subjective exploration system and utilizes study and trial research routines, the scientist utilized essential sources to gather information from butchers at Kpando metropolitan in the Volta Region of Ghana. The overview examination was utilized to investigate and build up cow bone as non-customary material for choosing gems.

Lowe et al (1958) clarified that, trial research strategy is additionally called exact research or circumstances and end results research system; it is an information based examination, concocting conclusions which are equipped for being checked with perception and analysis. Trial exploration is proper when verification looks for that sure variables influence different variables somehow.

In research, the researchers investigate setting, social phenomena. Some graphic or illustrative work to give the foundation data expected to arrange unmistakable or logical exploration. Other examination tasks are completely reviewed, despite the fact that they can continue for a considerable length of time. As an illustration: when you attempt to do survey research, ethnographic studies usually are considered explanatory.

Pamela () on the perspective that, exploration is a methodological methodology that is basically worried with disclosure and with producing or building hypothesis. In an immaculate sense, all examinations are exploratory. In the sociologies exploratory examination is married to notice, investigation research as a voyager. In this connection investigation may be considered as a point of view, a perspective, a unique individual introduction Stebbin (2001) communicated that, towards drawing nearer and completing social harm. Factories (1959) clarified that, on scholarly craftsmanship course portrayal of the way of life of the social researcher as a traveler is a rich and a nifty gritty record of how to do exploratory examination. Stebbins (2001) underscored, additionally adds to the thought of the connection, how the investigation alludes to the general methodology.

Stebbins (2001) states that, exploratory examination is a kind of examination that is led to an issue that has not yet been unmistakably characterized. It looks to build up the general pattern of things or exercises in a surrendered set without fundamentally concentrating on one single issue. Exploratory examination is done when an issue has not been characterized. It decides information accumulation routines, examination configuration and determination of subjects. Exploratory examination is an exploration that has accomplished for an issue that has been unmistakably distinguished. For the most part, individuals are not worried with portrayal at this stage. They were essentially watching the diverse sort of marvels that can happen.

Shrivvastava (1998) states that, exploratory examination is characterized as a kind of exploration done when the issue has not been unmistakably characterized. It is utilized to decide the most ideal approach to research, gather information and subject determination, exploratory examination is directed into an issue or issues where there

are few or no prior studies to allude to. The emphasis is about picking up bits of knowledge and recognition for later examination.

Stebbins, (2001) opines that, exploratory examination is utilized to clear up an apparent issue. It is important to guarantee that if there is an issue. It is unmistakably comprehended before an organization prescribes assets to address one of the greatest troubles; exploratory examination is that it is basically utilized when there is a nonappearance of known data around a subject. As the term propose, exploratory is frequently directed on the grounds that an issue has not been unmistakably characterized up 'till now, or its genuine degree yet vague. It permits the analyst to acclimate with the issue or idea to be contemplated, and maybe create speculation to be tried. It is startling examination, before the more definitive exploration is undertaken. Exploratory examination decides the best research outline, information accumulation routines, and determination of subjects, and infrequently it even reasons that, the issue does not exist. Another regular purpose behind leading exploratory examination is to test ideas before they are placed in the commercial center, dependably an unreasonable try. In idea testing, buyers are furnished either with a composed idea model for another, reconsidered or repositioned item, benefit methodology.

Exploratory examination can be entirely casual, depending on optional research, for example, surveying accessible writing or information or subjective methodologies, for example, casual talks with shoppers, representatives, administration or contenders, and more formal methodologies through top to bottom meetings, center gatherings, projective techniques, contextual investigations, or pilot considers. The after effects of exploratory examination are not conveniently for choice making independent from anyone else, but rather they can give noteworthy knowledge into a given circumstance. Despite the fact that the consequences of subjective examination can give some sign as

to the "why" "how" and "when" something happens. It can't let us know 'how regularly? At the end of the day, the outcomes can neither one of the best summed them up; are not illustrative of the entire populace being concentrated on.

Blakstad, experimental research is commonly used in sciences such as Sociology, Psychology, Physic Chemistry, Biology and Medicine etc. It is a collection of research designs which use to manipulate one more variable.

The experimental research is often used where:

1. There is time priority in a causal relationship.
2. There is consistency in a caused.
3. The magnitude of the correlation is great.

The word experimental research is a large of definition. In the strict sense, experimental is an experiment. This is an experiment where the researcher manipulates one variable, and control or randomizes the rest of the variables. It has a control group, the subjects have been randomly assigned between the groups and the researcher only tests one effect at a time. It is also important to know what variables are tested and measure.

A wider meaning of test exploration or semi investigations tends to fall in the middle of the strict and widest definition. A general guideline is that physical sciences, for example, material science, science and topography have a tendency to characterize tests more barely than sociologies, which direct investigations closer to the more extensive definition.

Points of Experimental Research Experiments are led to have the capacity to foresee wonder. Ordinarily, an examination is built to have the capacity to clarify some sort of

causation. Exploratory examination is critical to society-it helps us to enhance our regular lives. Distinguishing the examination issue.

In the wake of choosing the point of interest, the specialist tries to characterize the examination issue. This helps the scientist to concentrate on more tight research zone to have the capacity to study it properly. Characterizing the exploration issue plans an examination theory, which was tried against the invalid speculation. The examination issue is regularly operation to characterize how to quantify the exploration issue. The outcomes will rely on upon the definite estimations that the analyst picks and may be worked distinctively in another study to test the fundamental finishes of the study. An adhoc investigation is a theory designed in the wake of testing is done, attempt to clarify why the opposite confirmation. A poor adhoc investigation may be seen as the specialist failure to acknowledge that speculation isn't right, while an extraordinary adhoc examination a critical revelation. Developing the Experiment; there are different angles to recall while building an analysis, arranging a head guarantees that, the outcomes mirror this present reality, in the most ideal way.

Sampling Groups to Study; examining gatherings are right, particularly imperative when more than one condition in the analysis. One specimen aggregate frequently serves as a control bunch, whilst others are tried under the test conditions.

Using so as to choose the example gatherings should be possible a wide range of testing strategies. Populace examining may be picked by various systems, for example, randomization, 'semi randomization and matching. Decreasing examining blunders is key for getting substantial results from the examination. Analysts frequently conform the example size to minimize shots of arbitrary mistakes.

Lowe (1958) clarifies that, exploratory examination technique is additionally called Empirical research or circumstances and end results research system, it is an information based examination, thinking of conclusions which are equipped for being checked with perception and trial. Trial exploration is proper when evidence looks for that sure variables influence different variables somehow.

Such research is portrayed by the experimenter's control over the variables under study and the conscious control of one of them to study its belongings. In such an exploration, it is important to get at truth's hand, at the source, and effectively do certain things to empower the creation of sought data. Analyst gives a working theory or supposition as to the likely results. At that point work to get enough actualities (information) to demonstrate the study sets up test plans, which was utilized to control the general population concerned and delivered the wanted data.

3.3 Facilities Available

Library research in KNUST sample thesis formed the basis at which the researcher greatly developed the skills for the study and gathered secondary information relevant to the study including the Internet. International art centre as a source of primary information from jewelry sellers and few jewelry users.

3.4 Population for the Study

The researcher selected four groups of people for the study, butchers, bone carvers, jewelry sellers, and jewelry collectors. The researcher selected Kpando municipal butchers for the study in the Volta region of Ghana.

3.4.1 Accessible Population

In the municipal slaughterhouse, the researcher selected sixty butchers from the slaughter house and district meat shop for the study. The researcher selected twenty bone carvers from the Afadzato South District for the study. The researcher selected sixty jewelry sellers and sixty users from Art Centre, Great Accra Region of Ghana for the study.

3.4.2 Sampling Technique

The researcher used a convenience sample of non-probability sample design to get the sample size, Butchers in Kpando District Market, Bone Carvers in Afadzato South District, Jewelry sellers in International Art Centre, Jewelry collectors in. The researcher selected the respondents, considering experience respondents will give valid information to rely upon for the study.

From the stratified table below, the researcher was limited to a quarter of the total population, thus the total target population was stratified to three fourth to get the accessible sample population. This was due to insufficient fund to contact the respondents on the time scheduled.

3.4.3 Sample Size

The researcher selected sixty butchers, twenty bone carvers, sixty jewelry sellers, sixty jewelry users.

Table 3.1: Population of the study (Sample Size)

Groups	Number of Respondents	Percentage
Butchers	60	30
Bone Carvers	20	10
Jewelry Sellers	60	30

Jewelry Collectors	60	30
Total	200	100

3.5 Data Collection Instruments

The instruments used for data collection were observation, interview, and questionnaire. The researcher used four separate types of questionnaire to collect data and a set of questionnaire for each group butchers in the slaughterhouse and meat shop, bone carvers, jewelry sellers, and jewelry collectors. The instrument was tested before using in the researcher's village with local goat slaughters for domestic uses. The evidence gathered from local slaughterhouse proved the validity and reliability of the instruments. The researcher gave twenty seven questions to butchers, which includes both closed and opened questions with expected responses and was able to establish what makes cattle bone as a material for jewelry, twenty six questionnaires were given to bone carvers, ten questionnaires were given to jewelry sellers, and nine.

3.5.1 Administration of Data Collection Instrument

The questionnaire was administered by the researcher to the selected respondents, the researcher had personally contacted the respondents explained the aim and nature of the research to them. The respondents were shown what to do after a week the questionnaires were collected. Four separate questions were set. A copy of the questionnaires was given to each respondent in each group, twenty seven questionnaires were given to butchers in the slaughterhouse and meat shop, twenty six questionnaires were given to bone carvers, ten questionnaires were given to jewelry sellers, nine questionnaires were given to jewelry collectors. The total sum up of the questionnaires was sixty two.

3.5.2 Validity of Data Collection Instruments

The researcher used three approaches to measure the test, face validity, content validity, construct validity. The questionnaire and interview were prepared and given for cross checking with colleagues and academicians to read through to determine the validity. The final validation was done by the supervisor.

Interview

Sixty (60) Butchers of the slaughterhouse and meat shop at Kpando District were interviewed. The researcher applied for conducting interviews through the chief butcher with the photocopies of admission letter and student identity card.

Before the exploration and interview date and time was scheduled and a copy of the interview guide was given to the interviewee to glance through and prepare for the interview.

The researcher's application went through the same procedure and the interviews were conducted in February and March 2014. The researcher interviewed:

Sixty (60) jewelry sellers in Ghana, International Art Centre, Accra, Ghana.

Twenty (20) Bone Carvers at The Afadzato South District in Volta Region Ghana.

Sixty (60) jewelry collectors on the Kpando District Market.

3.6 Data Collection Procedure

This study was limited to Ghana, part of the study was conducted in Accra where all tribes of Ghanaians are settled, retrieving the questionnaires was easy because the researcher knew the location and phone number of each respondents.

The researcher used experimental research method to create a selected number of jewelry out of cattle bone to prove the hypothesis of cattle bone as a material for jewelry.

The purpose of the study was to use cattle bone as material to create jewelry.

Objectives

1. To examine what makes cattle bone as a jewelry material.
2. To identify suitable jewelry that can be produced from cattle bone.
3. To produce earrings, pendants and rings from cattle bone.

Research Questions

1. What makes cattle bone a jewelry material?
2. What types of jewelry can be produced from cattle bone?
3. How can earrings, pendants and rings be produced from cattle bone?

3.6.1 Data Collection for Objective one

Activity 1 the researcher survey the sources of cattle bone based on objective one.



Plate 3.1: The legal source of cattle bone



Plate 3.2: Butchers deflecting the cattle



Plate 3.3: The leg of the cattle

Plate 3.4: Discarded thigh bone of cattle

Through interviews with the researcher collected the following data about the qualities of bone at the same in other jewelry materials and ivory which makes it a suitable material for jewelry.

Lightweight: it can be manipulated into specified weight needed.

Good strength: it has a very good strength to stand the pressure during carving processes.

Heat resistance: it doesn't transfer heat.

Tarnish or Rust: it won't tarnish rust when using or not.

Irritation: it doesn't cause irritation to the body.

Lustrous: it has a lustrous white and cream color.

Discoloration: it doesn't discolor the skin.

Absorption: it absorbs dyes and paints.

Polished: it can be polished.

Fading: it won't fade in sunlight or react to chemical or salty water (sweat).

Shape: it can be shaped into desired shapes and sizes.

Fixing: it can be fixed onto other jewelry materials in combination.

Comfortability: it has the qualities of other jewelry materials in them that made it comfortable for the wearers.

Timeless: it doesn't waste time when cleaning and wearing.

3.6.2 Data Collected for Objective two

Activity 3 Selection of suitable Jewelries based on Objective two

Cattle bone has all the qualities stated in objective one, of jewelry materials that made it comfortable and beautiful to create and wear it selected jewelries such as earrings, pendants, necklace, and rings.

Types of Jewelry: Earring, Pendant and Rings

Stud earring: is the smallest and simplest design. The stud is attached to a post that goes through the ear and is held in place with slip on the back.

Chandelier earring: this dangle from the earlobe to a point at one inch or more below the earlobe.

3.6.3 Data collection for objective three

Activity4. Based on the objective three, the researcher selected the compact bones for the preparation. Since the bones contains marrow and flesh meat from butchers meat shops and cold stores the researcher prepared the bone for use.



Plate 3.5: Removing the bone marrow



Plate 3.6: Decomposing the bone marrow and flesh of the cattle bone

Activity 5 based on objective three the researcher went through preparation treatment of the bone.



Plate 3.7: Deflecting and degreasing the bone.



Plate 3.8: Application of lime to bone for removal of unpleasant smell and bleaching of bone.



Plate 3.9: The bones in drying stage

Activity 6 based on objective three

Having made a selection of the suitable jewelry that can be created from bone, preliminary sketches were developed into working drawing with details of shapes, sizes and arrangement. Since the researcher had visited the art centre and identified different types of jewelry created from bone and other materials, ideas were based on the activity that went on during the observations and interviews. The information obtained guided the researcher to design and produce a few numbers of jewelries, at this stage material was considered.

Design stages

Preliminary Sketches



Fig 3.1: Preliminary Sketches for the Ear Rings





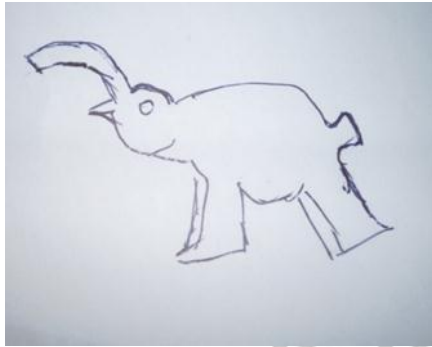


Fig 3.5: Sketch of an elephant.



Fig 3.6: The arranged Earring



Fig 3.7: Sketch of a heart.

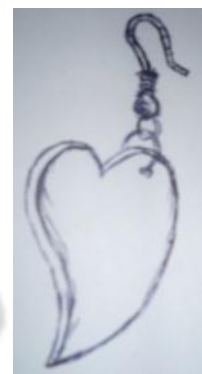


Fig 3.8: The arranged Earring

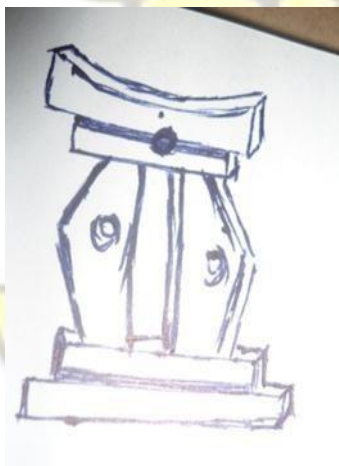


Fig 3.9: Shows stool.



Fig 3.10: The arranged Earring.

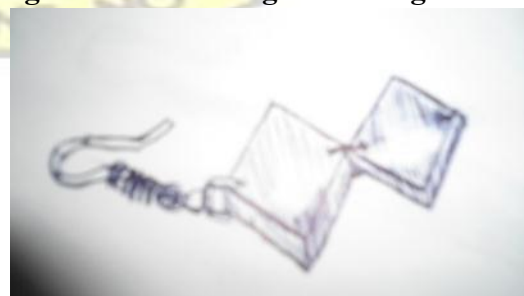


Fig 3.11: Shows the shapes.



Fig 3.13: The Sketched crocodile.

Fig 3.12: The arranged Earring



Fig 3.14: The arranged Earring.



Fig 3.15: The sketched knot shape.



Fig3.16: Shows the arranged earring.



Fig 3.17: Shows shapes cube.



Fig 3.18: Shows the arranged Earring



Fig 3.19: sketches for the Pendants

Activity 7 Based on Objective three the Researcher demonstrates the various

Bone Carving Processes to achieve different designs



Plate 3.10: Splitting bone with hacksaw.



Plate 3.11: Filing the bone into shape



Plate 3.12: the bone held tightly with vise and filed into desired shape



Plate 3.13: Cutting the bone with hacksaw tightly held with a vise



Plate 3.14: Boring hole in the carved bone.



Plate 3.15: Smoothing the bone items



Plate 3.16: Washing the bone objects



Plate 3.17: Dyeing the shaped earrings with potassium chloride.



Plate 3.18: The dyed bone earrings.



Plate 3.19: Polishing the bone earrings.



Plate 3.20: Different sets of earrings produced from cattle bone.



Plate 3.21: Different sets of Pendants produced from cattle bone.

Activity 8: The test for finished products

Based on the outlines the researcher conducted a prototype test for the suitable jewelries, involving few females wearing the earrings for it natural qualities sustainability, durability, beauty and, comfort ability.

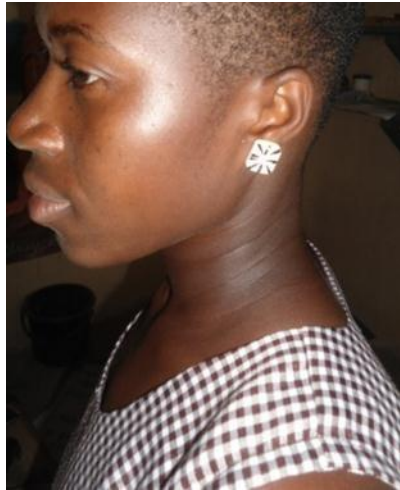


Plate 3.22: Display of Stud Earring.



Plate 3.23: Display of Chandler Earring.

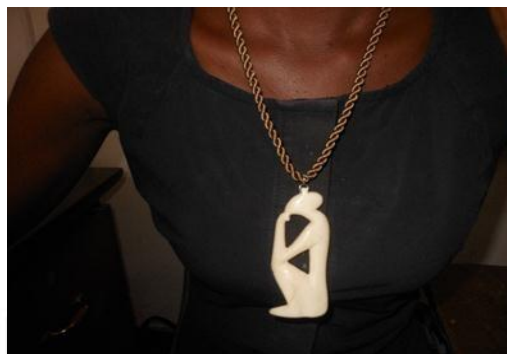
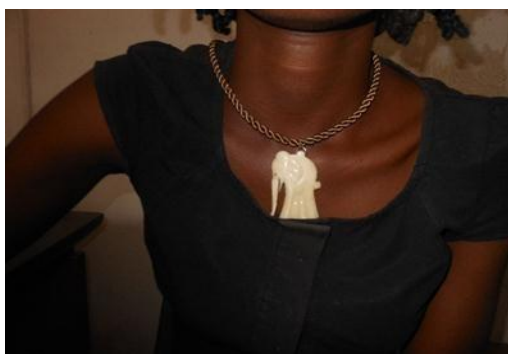


Plate 3.23: Display of Pendants



Plate 3.24: Display of Pendants



Plate 3.25: Display of Pendants

3.7 Validity and Reliability

Face Validity: the researcher gave simple questions to the respondents for simple understanding and was answered, correctly for data collection, such as both closed and open ended questions.

Content validity: the researcher measured the test responded to establish the main contents using the instruments to provide the correct coverage of the topic, cattle bone as a material for jewelry by seeking the experts opinions, do the literature searches, With prestige open ended questions.

Construct validity: the researcher defined what bone is and what makes cattle bone as a jewelry material as an example for respondents to follow that of the researcher. The researcher formulated the previous definition of the respondents and was able to develop a meaningful, useable test to evaluate, the researcher measured the data, compared them with the test measured and determined the fact that cattle bone as a material for jewelry.

Steiner et al (2007) expressed that, unwavering quality allude to two things. Initially unwavering quality means the analysts would get comparable results in the event that they rehashed the poll soon a short time later with the same laborers. The poll's repeatability would be high. This called the test retest. They underline that unwavering quality concerns the consistency among the inquiries, identify with sadness, the scientist would anticipate that every one of the answers will be decently comprised. Wretchedness scientists were messy in guaranteeing the legitimacy or unwavering quality of the poll; it would have influenced their study's general results.

Note that unwavering quality and legitimacy cannot be demonstrated definitively, however results will be more exact if measures in a study are as solid and legitimate as could be allowed.

Golafshani (2003) confirmed that, reliability is the extent to which results are too consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. The researcher used three ways of reliability to rely on the test such as test retest, Equivalent form and internal consistency.

Test retest, the researcher estimate test retest reliability when administers the same test to the same people on different occasions.

This approach assumes that there is no substantial change in the construct being measured between the two occasions. The amount of time allowed between measures was critical. The researcher knows that if the same test has been measured twice the correlation between the two observations will depend in part by how much time elapses between the two measurement occasions. The shorter the time gap, the higher the correlation. This is because the two observations are related over time gap, the lower the correlation: this is because the lower two observations are related over time, the closer in time, the researcher gets the more similar factors that contribute to error. Since this correlation is the test retest estimate of reliability. The researcher can obtain considerable different estimate depending on the interval 1st time 2nd time is equal .

Internal Consistency, The researcher determined how all test items on the test related to all other items and provides a unique estimates of reliability for the given test and the researcher considered the most popular consistency to be reliable and the estimation was depression and anxiety of the participants to give effective answers to the test.

Equivalent Form, The researcher divides all items that supposed to measure the same construct into two sets. The researcher administers the entire instrument to a sample of people and calculates the total score for each randomly divided into half, using a split half reliability estimate, the simplest form of the correlation between these two total scores.

3.8 Data Analysis Plan

The responses to the questionnaire that were collected from the respondents were edited, coded and scored before it was put into the computer. Data analysis was done

using the Statistical Package for Social Sciences (SPSS). To make issues clear without having to read long sentences, tables with percentages were used to support the analysis.

This enhanced the presentation and discussion of the findings of the data. From the stratified table below, the researcher was limited to a quarter of the total population, thus the total target population was stratified to three fourth to get the accessible sample population. This was due to insufficient fund to contact the respondents on the time scheduled.

Table 3.2: Sampled Population for the Study

groups	Population of respondents	Sample population(75% of respondents population)	Sample population(25% of respondents population)
Butchers	60	45	15
Bone carvers	20	15	5
Jewelry sellers	60	45	15
Jewelry users	60	45	15
Total	200	150	50

CHAPTER FOUR PRESENTATION AND ANALYSIS OF RESULTS

4.1 Overview

This chapter is the presentation of data from jewelers and a sample of female and male persons who use cattle bone jewelry. This is intended to find out the perception of the users and traders on the patronage and use of cattle bone jewelry. Thirty (30) jewelers and thirty (30) jewelry users were sampled. Below are the results from the data collected from the field survey.

Jewelry Users

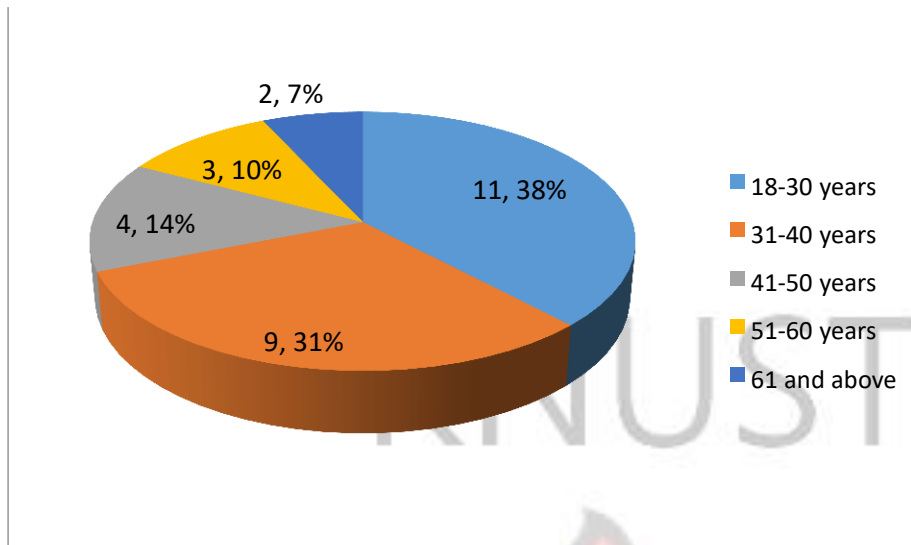


Figure 4.1 Age of Respondents

Source: Field Survey, 2015

Figure 4.1 Above shows the age distribution of jewelry users surveyed by the researcher. The majority of the female and male, 11 (38%) are between the ages of 18-30 years, the next larger proportion of the respondents, 9 (31%) are between the ages of 31-40 years. 4 (14%) of the respondents are between the ages of 41 and 50 years, 3 (10%) are between the ages of 51-60 years and 2 (7%) are above 60 years.

This indicates that the researcher conducted a fairly representative data collection with every significant female and male category captured; from the classy and fashion conscious young ladies and gentlemen to the aged.

Why Respondents wear Jewelry?

Figure 4.2 shows why respondents wear jewelry. Out of the 29 respondents who surveyed, 20 (69%) indicated that they wear jewelry because it makes them beautiful. 7 (24%) indicated that wearing jewelry makes them look more feminine and handsome 2 (7%) indicated that they wear jewelry because it portrays their tradition and it helps to maintain the tradition, these respondents are the aged women and men from the survey.

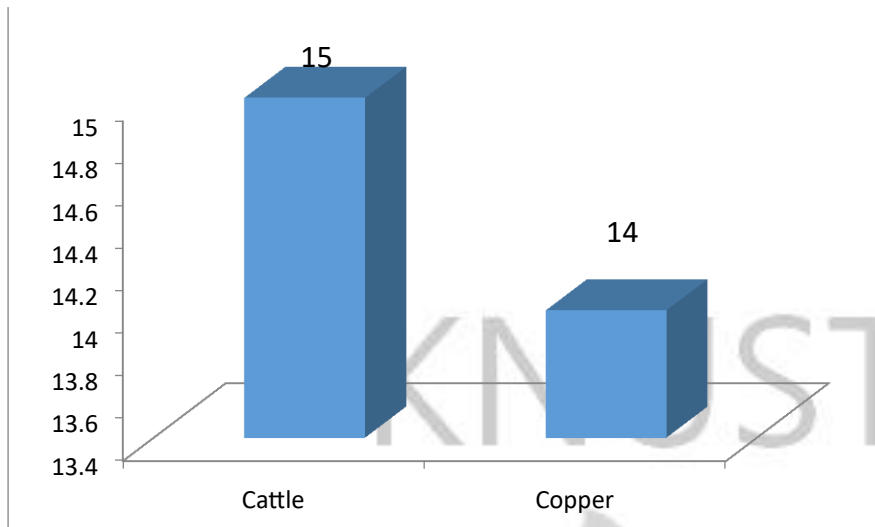


Figure 4.2 Kinds of Jewelry they like

Source: Field Survey, 2015

Figure 4.2 shows the distribution of the respondents on the kinds of jewelry they like. 15 of the respondents indicated that they like cattle bone jewelry, and 14 others indicated that they like copper or gold jewelry.

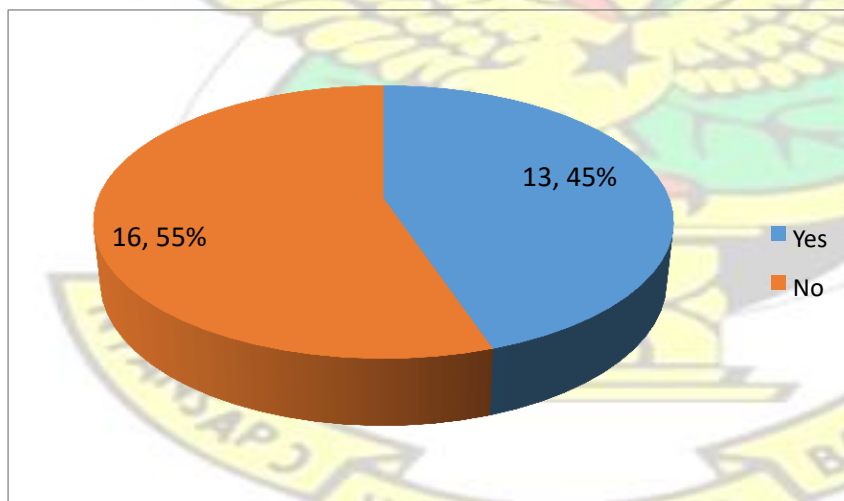


Figure 4.3 Get problems wearing Cattle Bone or other Material Jewelry

Source: Field Survey, 2015

Figure 4.3 present the response of the surveyed female and male on whether they experience any problems when they wear cattle bone jewelry or other jewelry. 16 (55%)

indicated that they do not encounter any problems when they wear cattle bone jewelry. 13 (45%) indicated that they encounter problems when they wear other material jewelry.

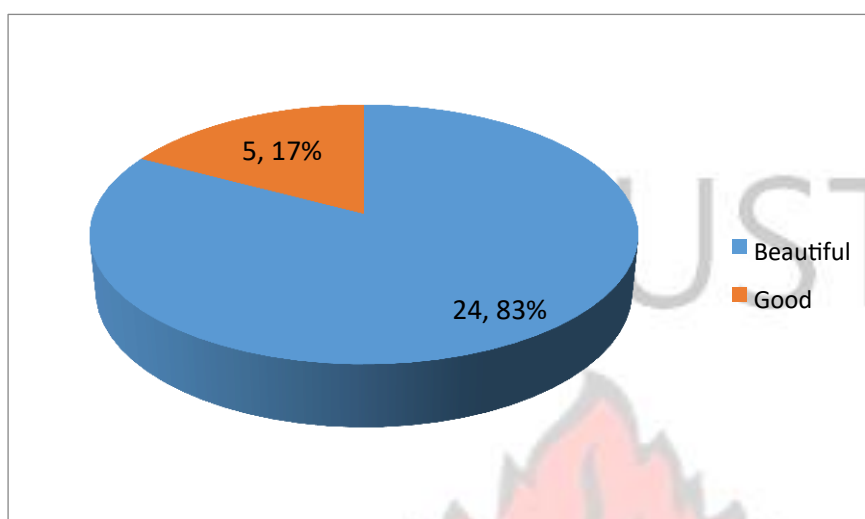


Figure 4.4 Perception on Cattle Bone Jewelry

Source: Field Survey, 2015

Figure 4.4 shows the perception of women in cattle bone jewelry. The majority of the respondents, 24 (83%) submitted that they think cattle bone jewelry is beautiful. 5 (17%) others indicated that they think cattle bone jewelry is good. When questioned whether these jewelries can be used for occasions, all twenty nine (29) respondents answered in the affirmative. That cattle bone jewelry can be used for occasions.

Table 4.1 Whether Respondent feels Comfortable wearing Cattle Bone Jewelry

Responses	Frequency	Percent
Yes	28	96.6
No	1	3.4
Total	29	100.0

Source: Field Survey, 2015

Table 4.1 presents the responses of the surveyed cattle bone jewelry users on whether they feel comfortable wearing cattle bone jewelry. 28 (96.6%) of the respondents indicated that they feel comfortable wearing cattle bone jewelry. However, 1 (3.4%) indicated that she does not feel comfortable wearing cattle bone jewelry.

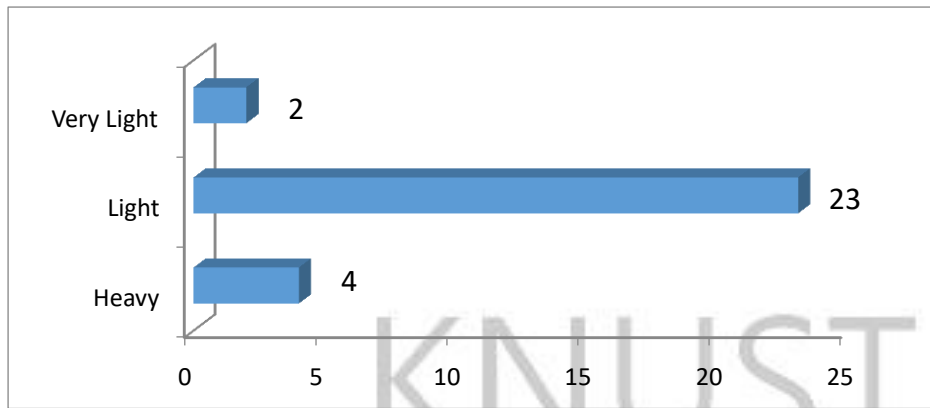


Figure 4.5 Jewelry made from Cattle Bone are

Source: Field Survey, 2015

Figure 4.5 shows the perception of respondents on the weight of cattle bone jewelry. The researcher questioned the respondents requesting them to comment on a rating scale of Very heavy, heavy, light and very light. The results show that 23 (79.3%) indicated that cattle bone jewelry is light. 4 (13.8%) indicated that cattle bone jewelry is heavy. Also, 2 (6.9%) indicated that cattle bone jewelry is very light.

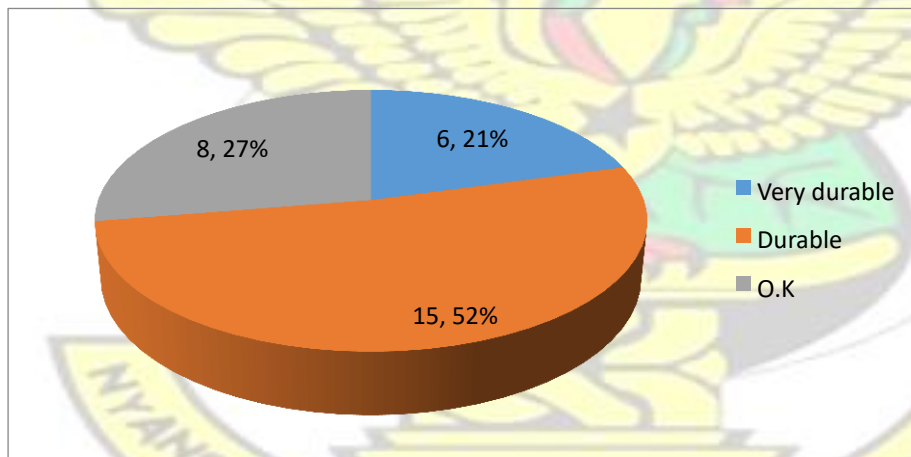


Figure 4.6: Qualities in cattle bone

Source: Field Survey, 2015

Figure 4.6 respondents' perception on the durability (quality) of cattle bone jewelry. The majority of the respondents, 15 (52%) indicated that cattle bone jewelry is durable. 8 (27%) also indicated that cattle bone jewelry is Moderate (OK). 6 (21%) others indicated that cattle bone jewelry is very durable. None indicated that it was weak or

very weak. It can hence be concluded that cattle bone jewelry is durable, beautiful, less weighty, but relatively expensive to the buyers.

Jewelers

30 Jewelers or jewelry makers were also surveyed. 1 questionnaire was rendered invalid and hence was not considered in the analysis.

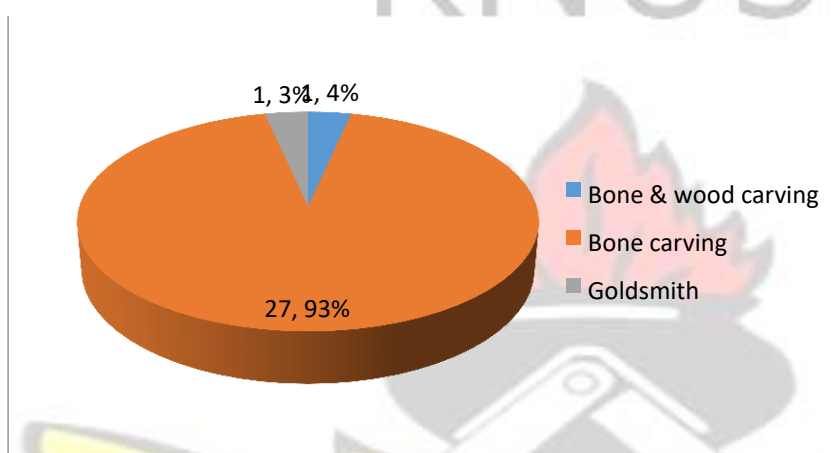


Figure 4.7 Occupation

Source: Field Survey, 2015

Figure 4.7 shows the distribution based on the occupation of the jewelers or jewelry sellers. 27 (93%) indicated that they engage in bone carving. One other respondent indicated that he/she engages in bone and wood carving. One (1) other respondent indicated that the occupation he works as a goldsmith.

Table 4.2 Length of Years in the Occupation

Responses	Frequency	Percent
Less than 10	2	6.90
10 – 20 years	9	31.03
21 – 30 years	10	34.48
31 – 40 years	6	20.69
Above 40 years	2	6.90

Total	29	100
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Table 4.2 shows the responses on the number of years the respondent has been in the occupation. The majority of the respondents, 10 (34.48%) indicated that they have been in their occupation for between 21-30 years. 9 (31.03%) also indicated that they have been in the occupation for 10-20 years. 6 (20.69%) indicated that they have been in their occupation for between 31-40 years. 2 (6.90%) indicated that they have been in their occupations for less than 10 years. Two (2) others indicated that they have been in their occupation for over 40 years.

Table 4.3 Kind of Jewelry

Responses	Frequency	Percent
Bone jewelry	28	96.6
Gold jewelry	1	3.4
Total	29	100.0

Table 4.3 shows the kind of jewelry the respondents sell. 28 (96.6%) indicated that they deal in bone jewelry. 1 (3.4%) indicated that he sells gold jewelry.

Table 4.4 Whether Respondent will sell Cattle Bone Jewelry

Responses	Frequency	Percent
Yes	28	96.6
No	1	3.4
Total	29	100.0

Table 4.4 shows the responses on whether respondent would sell cattle bone jewelry. 28 (96.6%) indicated that they would sell cattle bone jewelry. One (1) person indicated that

he will not sell cattle bone jewelry. Because the price is lower than that of gold and therefore he cannot get higher profit.

All the respondents think that their customers would wear cattle bone jewelry. They suggested that the jewelry should be sold for prices between Ghana cedis 5 – 100. **Table 4.5 Perceptions on the Weight of the Cattle Bone Jewelry**

Responses	Frequency	Percent
Very Heavy	1	3.4
Heavy	1	3.4
Light	27	93.1
Total	29	100.0

Table 4.5 shows the perceptions of the respondents on the weight of cattle bone jewelry. 27 (93.1%) of the respondents indicated that cattle bone jewelry is light in weight. One person indicated that cattle bone jewelry is heavy. Another one person indicated that cattle bone jewelry is very heavy.

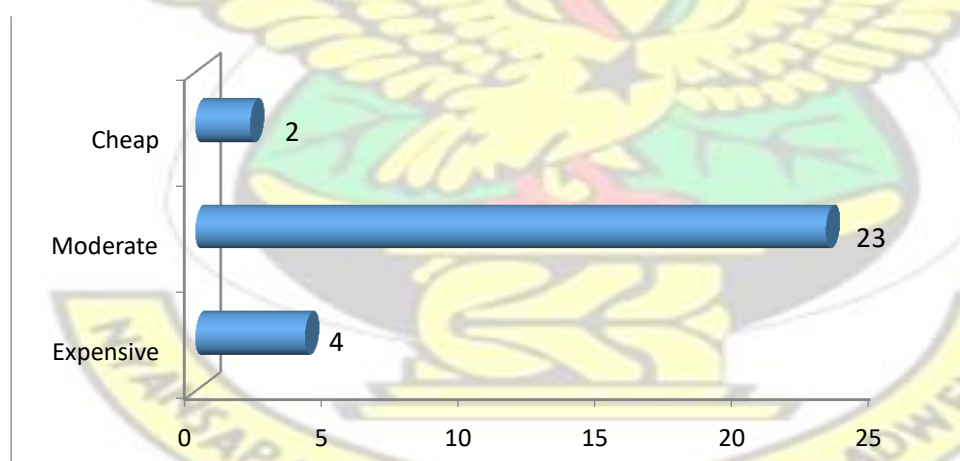


Figure 4.8 Value of cattle bone jewelry (Jewelers' perspective)

Source: Field Survey, 2015

Figure 4.8 shows the value placed by the jewelers on the price of cattle bone jewelry.

23 (79.3%) indicated that the prices of cattle bone jewelry are moderate. However, 4 (13.8%) indicated that cattle bone jewelry is expensive. Conversely, 2 (6.9%) indicated that cattle bone jewelry is cheap.

Table 4.6 Durability of cattle bone jewelry

Responses	Frequency	Percent
Very durable	2	6.9
Durable	27	93.1
Total	29	100.0

Table 4.6 shows the responses of respondents on the durability of cattle bone jewelry. 27 (93.1%) indicated that cattle bone jewelry is durable. More so, 2 (6.9%) other respondents indicated that cattle bone jewelry is very durable.

CHAPTER FIVE SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Creating Cattle Bones into suitable Jewelry for use

From the literature and the Figures in Objectives, it is clear that cattle bones can be suitably used for jewelry (earrings, pendants and rings), which would look beautiful and possess similar and even better characteristics compared to other jewelry from other materials. Figures from Objective three show the step by step process undertaken by the researcher to produce the final product (cattle bone jewelry) of different shape and styles of jewelry.

5.1.2 The suitability and use of Cattle Bone by Jewelry users

Jewelry sellers (those who deal in sales of jewelry) were surveyed on their perception of sales and characteristics of cattle bone jewelry for sale. Most of the jewelers interviewed were into bone carving. While others were into bone and woodcarving and goldsmith. They indicated that they would deal with cattle bone jewelry sales and the suggested prices will be between Ghana cedis 5 and Ghana cedis 100. They perceive that the cattle bone jewelry were light in weight, however on the price of the jewelry, they indicated as with the consumers that the price is moderate to expensive. They also agree with the customers that the cattle bones are durable to use.

5.1.3 The suitability and use of Cattle Bone Jewelry by users (consumers).

Most of the users interviewed were within the ages of 18 and 30 years, the crosssection of the population who are conscious of their beauty, who make attempts to make themselves attractive. They indicated that they like cattle bone jewelry, because it has no side effects to its use: such as, itching body, or weight on the ears. They also perceive that it is beautiful to wear and they are comfortable with wearing cattle bone earrings, pendants, and rings. Some properties of the jewelry they pleased with, was light and durable jewelry. However, they were not satisfied with the selling price, hence indicating that the prices were moderate to expensive.

5.2 Conclusions

Cattle bone jewelry manufacturing has not seen much patronage because of the limited research and knowledge in this area of production. However, it is one area that could be of immense economic value to the Ghanaian economy and to the benefit of the tourism industry in Ghana. It is therefore expedient that the government make efforts to

consider this area so as to create jobs, reduce expenses (spending) and encourage foreign trade in Ghana.

5.2 Recommendations

Cattle bone as a material for ornaments is a wise and creative way of material utilization; however, the patronage has not been so high because it has not been largely advertised across the country. The following recommendations therefore are made:

1. The ministry of Trade and Industry should encourage the industry involved in traditional crafts and artifacts by intensifying advertisement and promotion of these products among the Ghanaian populace using the media channels. This will entice consumers and would create a new and sustainable industry, which will lead to other benefits. Benefits like the reduction in expenses spent in cattle bone management and the overall waste management.
2. The Educational institutions should encourage research into this area to strengthen this area for growth and development.
3. The ministry should also consider subsidizing materials used in transforming and manufacturing cattle bones into final products so that per unit costs will be reduced hence encouraging production and patronage in the society.

REFERENCES

- Aditi Simlai Tiwari, Innovative Cow Bone Jewelry retrieved on 3/3/2015 via: dezeen.com Aditi Simlai Tiwari Innovative Fashions Writer InventorSpot.Com.
- Stebbins, R. A. (2001). *Exploratory research in the social sciences* (Vol. 48). Sage.
- Carus L.A & Borganca S.R (2013) Investigation of spodumene-bearing rock as flux for bone china production vol. 16, no 6, ISSN 1516-1439, <http://dx.doi.org/10.1590/81516-1439201300500143>.
- Charles Choi (2013) Did Neanderthals Teach Modern Humans How to Make tools, retrieved on 20/4/2015 from [Live Science.c.om](http://LiveScience.com).
- Dapzury Valenzuela Pallavi Shrivastava. 1998 interview as a method for Qualitative Research. Retrieve April 15, 2014, from www.public.asu.edu/www500/interviewFri.pdf
- David Strener, Geoff Norman, (2007) what researchers means by validity and reliability. Retrieve 13, 2014, from www.lwh.on.ca/wrmb/validity-and-reliability
- Dawson Catherine. Practical research Methods, New Delhi UBS Publishers. Retrieved 10, 2014, from www.lhmctam.edu/PDF/Notes/Research_Methodology.pdf.
- Eunice Kennedy Shriver (2012) Osteoporosis, retrieved on 30/3/2015 from 2AMS, Bethesda, MD 20892-3676, Phone: 202-223-0344-toll free: 800-624-BONE(2663), fax: 202-294-2356, Email: NIHBoneInfo@mail.nih.gov, website: <http://www.bones.nih.gov>.
- Fisher J. (1996) Jay Fisher- world Class Knife maker. The Jay Fisher Company.
- Gillian Anderson. What is low bones density called? Retrieved April 11, 2014, from www.ask.com/question/how.bones
- Gina Wisker. Palgrave Study Skills, (2014), Macmillan Publishers LTD. Retrieved April, 13, 2014, from www.palgrave.com/skills4study/studentlife/postgraduate/choosing.asp.
- Golafshani, N (2003), Understanding Reliability in Qualitative Research. <http://www.nova.edu/ssw/QR/QR-4/golafshani.pdf>
- Karin, Teresa, Isabelle Zita, Muzition et al, How to tell the difference between bull, cow, steers and heifers step. Retrieve 15, May, 20014, from www.wiki/Tellthe-Dift
- Kothari & C.R. (1985), Research Methodology methods and Techniques, New Delhi,

- Wiley Eastern Limited. Retrieved, April 10, 2014, from www.lhmctam.edu/PDF/Notes/Research_Methodology.pdf
- KrisHirst. History of cow domestication. Retrieved April 11, 2014, from [www.achealogy.about.com/od/dometication/qt/cattle.htm/cattle\(Bosespp\)](http://www.achealogy.about.com/od/dometication/qt/cattle.htm/cattle(Bosespp))
- Kuchelmen H.C. & Zidarov.P (2005) Huristwic Viking-Age Ice Skates. Huristwic. LLC.
- Kumar & Ranjit, (2005), Research methodology-A step by step Guide for Beginners, (2nd edition), Singapore, Pearson Education. Retrieved 10, April 10, 2014, from www.lhmctam.edu/PDF/Notes/Research_Methodology.pdf
- Leech, N.L. & Onwugbuzie, A.J. (2007) Issues regarding Reliable and valid research studies.
- Lowe Belle, 1958 experimental cooking John Willey & sons, New York.
- Mackenzie ,N & Knipe, S (2006), Research dilemmas: methods and Methodology. Issues in Educational Research. Retrieve April 13, 2014, from <http://www.iier.org.au/iier16/mackenzic.html>
- Mucalo M.(2010) Processing cattle bone for human use retrieved on 7/4/2015. available at www.biotechlearn.org.nz. Published by Metadata.
- Rebecca Boyle (2011) Ground up animal meat and Bone could be Turned into Biogradable Plastics. Bonner Corporation Company.
- Rebecca Boyle (2011) Ground-Up animal meat and Bone could be turned into Biogradable Plastics. Bonnier Corporation Company.
- Rory, O, Brien. An Overview of the Methodological Approach of Action Research. Faculty of information studies, university of Toronto. Retrieve April 15, 2014, from www.web.ca/robien/papers/artifinal.html
- Schibler.J., Elsner. J. & Schlumbaum. A (2014) DNA Find reveals new insights into the history of cattle in Europe. Retrieved on 13/4/2015, www.sciencedaily.com. DOI:10.1038/srep05798 Ret 9/4/2015 140729073638.htm. University of Basel
- Schindelholz .E, (2001) A Simple Guide for Archeological Materials Characterization, Anthropology 3028, Department of Anthropology, University of Minneota.
- Taylor C.M. (2004) Cabinet Magazine University of Chicago Press.z
- The Eskimo Art Gallery (2013) Prehistoric Arctic Art, The distillery Historic District 8 case Goods L/A #220, Toronto, Canada Map 416-366 3000 (in Toronto) 1888-238-5442 available <http://www.inuitart.com>.

The free encyclopedia (2010) from Wikipedia retrieved on 25/4/2010

Top 10 creative uses For Bones retrieved on 10/4/2015 available at Toptenz.net.

Winkelman. R. (2004), Mammal Anatomy: Skeleton, retrieved on 4/6/2013 from S.G. Goodrich, The Animal Kingdom illustrated (New York: A.J. Johnson & Co, 1885) 496, Florida Center for Instructional Technology, College of Education, University of South Florida.



APPENDIX

QUESTIONNAIRE (JEWELLERS)

DEPARTMENT OF INTEGRATED RURAL ART AND INDUSTRY

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

This research is solely for academic purpose and hence your confidentiality is assured.

The topic is: CATTLE BONE AS JEWELRY MATERIAL. Please spare some time to answer the following questions.

1. Occupation.....
2. How long have you been in the occupation.....(years)
3. What kind of jewelry do you sell?
4. Would you sell jewelry made of cattle bone? Yes [] No []
5. If No, why?.....
6. Do you think that your customers would wear jewelry made of cattle bones?
Yes [] No []
7. How much do you think the earrings should be sold?.....Gh Cedis.
8. Earrings made from cattle bone are: Very Heavy [] Heavy [] Light []
Very Light []
9. Earrings made from cattle bone are: Expensive [] Moderate [] Cheap []
10. Earrings made from cattle bone look: Very durable [] Durable [] O.K []
Weak [] Very weak []

THANK YOU

QUESTIONNAIRE (JEWELRY USERS)

DEPARTMENT OF INTEGRATED RURAL ART AND INDUSTRY

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI, GHANA**

This research is solely for academic purpose and hence your confidentiality is assured.

The topic is: CATTLE BONE AS JEWELRY MATERIAL. Please spare
some time to answer the following questions.

1. Age.....(years)
2. Why do you wear jewelry?
3. What kind of earrings do you like?
4. Do you get any problem when you wear earrings or other jewelry? Yes []
No []
5. What do you think of this earring (cattle bone made)? Beautiful [] Good []
Not Bad [] Poor [], Others comments,.....
6. Can earrings made from cattle bone be used for occasions? Yes [] No []
7. Do you feel comfortable wearing earring made from cattle bone? Yes [] No
[]
8. Earrings made from cattle bone are: Very Heavy [] Heavy[] Light []
Very Light []
9. Earrings made from cattle bone are: Expensive [] Moderate [] Cheap []
10. Earrings made from cattle bone look: Very durable [] Durable [] O.K []
Weak [] Very weak []

THANK YOU