

## BROWN BEAR MAULINGS ON DOMESTIC ANIMALS IN ROMANIA – PRELIMINARY STUDY

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### Abstract

*The study aimed to describe the morphology of injuries produced by brown bear (Ursus arctos) on domestic animals such as cattle, sheep, pig and chicken. The study has been conducted during the period 2014 -2016 in Romania, Argeş County. The lesions have been described in fifteen dead animals and two injured animals left alive. Indirect methods for identifying the attacking species were used by collecting samples from the site of the attack (hair, faeces and footprints). Dead animals have been examined by necropsy. Routine clinical examination has been done on alive animals. Additional information about the attacked animals has been gathered by interviewing the owners and hunting fund managers. The characteristic injuries for bear attack were represented by parallel and linear, superficial or deep wounds, bite marks, and tissue avulsions. Prey consumption appears to be characteristic in attacked animals, in humans being rarely mentioned. The specific localization of bear mauling are on head, neck, cervical and thoracic areas followed by upper hindquarters, forelimbs and hind limbs. The most serious injuries are represented by the neck and chest area features which have been observed in cattle examination. Mortality rate for the animals attacked by brown bear and found dead or alive is: 100% for chickens, 100% for pigs, 66.66% for sheep, 87.5% for cattle.*

**Key words:** brown bear, domestic animals, attack, mauling, Romania.

### INTRODUCTION

The biggest population of brown bear, one of the largest living carnivores in Europe, is dispersed in Romanian Carpathians.

This species is also a high priority in conservation in European Union, the number of individuals being an important indicator in management of wildlife species. (Zedrosser et al. 2001; Cotovelea, 2014).

The interaction between man and bear, bear and domestic animals had been always subjected for scientific research, media and movies. Being one of the largest carnivores in Europe and occupying the top of the food chain, anthropization and habituation reflect negatively on bear behaviour.

Consequently, the bears wander closer and closer to households and livestock, resulting in attacks on human and domestic animals (Pop, 2012; Tough, 1993, Zimmermann et al., 2003). The majority of attacks reported in humans occurred in forests or at the edge of the forests. All the events can be generally characterized as “face-to-face meetings” or “close encounters”

with a female bear with cubs, or with a feeding bear. All these situations are considered self-defence of the individual, as result of a surprise or unpredicted meeting.

Regarding the domestic animals, these are attacked in households situated in mountain, submontane area and at sheepfold, case in which the bear gets its food.

The importance of the study emerges from the lack of description of injuries caused by bear in animals, comparing with reported cases in humans.

The study area, Argeş County, houses an average population of 700 brown bears, this population is slightly increasing in the past years. (Environmental Protection Agency Argeş County – bear statistics).

### MATERIALS AND METHODS

The period analysed in this study was 2014-2016, and refers to Argeş County, Romania.

Two groups of animals were studied, as follows:

- animals killed by bear attack: 7 cows, 2 sheep, 4 chickens, 2 pigs;
- animals that survived the bear attack: 1 cattle, 1 sheep.

Indirect methods of identification have been used, such as:

- samples from the households where the attack took place (hair, faeces);
- pictures of the scratches on the walls and bear footprints on the soil;
- testimonies of owners and hunting fund managers.

Dead animals were submitted to necropsy, using routine examination technique. Clinic examination was given to the alive animals.

## RESULTS AND DISCUSSIONS

The lesions observed during necropsy and clinical examination on dead or alive animals respectively are detailed in table 1.

Attack of the bear on domestic animals presents similar characteristics with the attack on humans, meaning that the main attacked body region are head and neck, followed by thorax and limbs. (Dhar et al., 2008)

The difference between human *versus* animals is that human is not considered as a genuine prey. Thus, bear attack on humans is considered self-defence and the bear does not eat them. Cases of consumption had been rarely reported, while the animals are attacked to be consumed.

Indirect methods of identification used in this study resulted undoubtedly in bear attack.

All gathered evidences from households within studied area pleaded for this conclusion: traces of paws, hair, scratches, faeces, type of injuries examined on animals.

The place where the attack occurred highlights traces that lead to indirect identification of the bear, such as dragging trace or dragging blood spatter, footprint on damp soil, scratches on the walls, hair, bear faeces.

The degree of specificity of these traces is very high, which makes confusion with other predators unlikely or impossible. Anatomic particularities of the limbs (plantigrade, flat-footed, five-fingered track), the type of the attack or the feeding type of this large mammal are reliable evidence for bear identification (Micu, 1998).

The injuries described both in humans and animals are also an important feature which can be used in indirect identification, being equally inflicted by teeth and claws. It is important to know the pattern of these injuries, so there can be made a differentiation from other species, such as wolves. It is known that interactions between bear and wolf involve food sources. Consequently, the same categories of criteria which support indirect identification are applied in both carnivores (Gunther and Smith, 2004).

The lesions made by bear attack on domestic animals can be summarized as follows:

- linear and parallel wounds (one to five lines corresponding to each claw) on the entire body, usually displayed on cervical, dorsal and upper hindquarters; these wounds may involve only the skin, or they can be deep, with various degree of soft tissue lacerations, reaching bone tissue.

- when claws penetrate the skin, it results in severe muscle laceration and rupture, organs rupture and perforation, leading to strong bleeding, hemopneumothorax, hemoperitoneum and hemopericardium.

- the bites, scratches and kicks lead to massive tissue loss and tissue consumption; dental marks are not so obvious on animals as they are on human skin.

- limb, ribs and spine fractures go frequently with lesions of soft tissues;

- bear may drag animals some distance, feature found out on pigs, cattle and sheep. The animals were dragged out from their shelters, dragging traces being observed on local vegetation or as dragging blood spatter.

Similarities with these injuries were reported in bear attack on human victims. Head lesions are represented by soft tissue injury; bite marks, laceration of the ear and head, avulsion of lips and eyes. Facial fractures occurred mainly in cheek, mandibula and maxillae, accompanied by similar lesions of neurocranium (mastoid bone, zygoma, occipital bones) (Ajazet al., 2010; De Giorgio et al., 2007; Prasad et al., 2013; Dharet et al., 2008; Thakur et al. 2007; Roka et al., 2012; Mihailovic, 2011).

Neck and dorsal region lesions were represented by perforation of the left internal jugular vein and bite wounds. Typically, lesions were featured by deep wounds located

3–5 cm apart and six parallel excoriations between them (teeth mark and claws), scratches and bite wounds on the back. Lacerations were observed also on thigh and lumbar area (Ajaz et al., 2010; De Giorgio et al., 2007; Dhar et al., 2008).

Limbs lesions involved soft tissues and bone, such as metacarpal, radius, ulnar, humeral, clavicle and scapula fractures, lacerations with tendon loss, biceps avulsions and gluteal laceration (Dhar et al., 2008).

The frequency of attacks may increase in the years with heavy winters such as the one of 2016-2017, and the years when bears did not receive any additional food from hunting fund managers.

Thus, more bear attacks on domestic animals are expected to occur in the next year when these carnivores need to feed for covering the losses produced during winter sleep. Romania's entry into the EU has imposed the common market milk quality standards.

Table 1. Lesions inflicted by bear on domestic animals

4 chickens	Injuries
7 chickens in household, only 4 corpses were found Figure 1.	-plucking -the entire body is covered with deep wounds, muscle laceration and rupture of internal organs - multiple bone fractures (limbs, ribs and cervical spine)
2 pigs	Injuries
pig 1 Figure 2.	- wounds, laceration, loss of skin and muscle tissue in the cervical region, cervical fracture; - superficial chest wounds or scratches that appears rectilinear single or parallel grouped; - forelimb muscle deep laceration and multiple fractures - organs of the abdominal cavity were completely consumed except cecum, colon and rectum - hind limb consumed 50%
pig 2 Figure 3.	- wounds and lacerations, loss of soft tissue in the cervical region - superficial wounds or scratches on thoracic area that appears rectilinear single or parallel grouped; - bite marks on forelimb, involving only the soft tissues - internal organs are intact - hind limb consumed 5%, bite wounds are present
Sheep; 5 sheep in the household, one was found alive, 2 corpses, 2 were not found	Injuries
Sheep 1 – corpse Figure 4.	- partial avulsion of head - cervical fracture, muscle laceration - multiple wounds on thorax, muscle rupture, multiple rib fractures - total consumption of the abdominal and thoracic organs - forelimbs: left foreleg consumed, multiple fractures on right foreleg multiple fractures of hindlimbs and bite wounds
Sheep 2 – corpse Figure 4.	- total avulsion of head - fracture of thoracic spine - multiple rib fractures, intercostal laceration - total consumption of the abdominal and thoracic organs - total avulsion of forelimbs - multiple fractures of hindlimb and bite wounds
Sheep 3 – alive Figure 4.	- cervical and thoracic area tinged with blood - superficial skin wounds on cervical and thoracic area - strayed animal in shock (traumatic shock)
Cattle: two corpses, one alive	Injuries
Cow 1 – corpse	- partial avulsion of head; absence of tongue and masseters (bilaterally) - spine: total avulsion of cervical segment (skin connects the head and thoracic limbs), partial avulsion of thoracic segment, lumbar spine fracture, pelvic fracture - evisceration of thoracic organs, total heart consumption, partial lung consumption - evisceration of the abdominal organs - total forelimb avulsion and consumption up to acropodial level
Cow 2 – corpse Figure 5. and Figure 6.	- thoracic spine fracture - multiple wounds in parallel arrangement of the dorsal thorax, laceration and deep muscle rupture, hemorrhage, multiple rib fractures, subcutaneous emphysema, lung rupture and lung collapse associated with pneumo-hemothorax - multiple parallel wounds on sacral and gluteal area, muscular laceration and haemorrhage
Cow 3 – alive Figure 7. and Figure 8.	- linear wounds on the side of the neck, perpendicular to the longitudinal axis, which cross the skin, subcutaneous connective tissue and regional muscles - wounds with parallel arrangement, produced by claws, on skin, subcutaneous adipose tissue and regional muscles, starting in the dorsal region of the withers, descending parallelly to the shoulder, arm and forearm (left); the sides of the thorax presents superficial wounds, with parallel arrangement, cervical wounds are shorter than those of withers - wounds with linear arrangement, parallel with sacral, buttock and flank that cross skin and subcutaneous connective tissue



Figure 1. Chickens, plucking, abnormal positions that suggest multiple bone fractures



Figure 2. Pig, consumption of upper hindquarters and abdominal evisceration

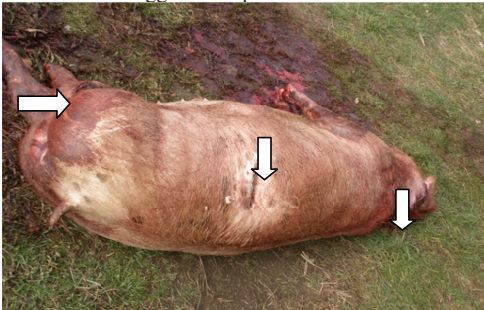


Figure 3. Pig, linear and parallel wounds over the body, deep linear wound on left hemithorax (middle arrow), loss of soft tissue in the cervical region (right arrow), left hind limb with a big bite wound and muscle rupture (left arrow)



Figure 4. Sheep, 1 alive in shock, 2 corpses with massive consumption, evisceration of abdominal and thorax organs



Figure 5. Cattle, wounds in parallel alignment on the dorsal thorax (arrow), laceration and deep muscle rupture, hemorrhage



Figure 6. Cattle after skinning, deep thorax wounds made by claws, with muscle laceration, muscle rupture, haemorrhage



Figure 7. Alive cow, linear wounds on the side of the neck, perpendicular to the longitudinal axis, which traverses skin, subcutaneous connective tissue and muscles regional, parallel superficial wounds on thoracic area made by claws



Figure 8. Alive cattle, wounds with linear arrangement, parallel with sacral, but to the flank that traverses skin and subcutaneous connective tissue

## CONCLUSIONS

Characteristic injuries produced by bear attack are linear and parallel wounds, in number of one to five lines corresponding to each claw, usually observed on cervical region, dorsal and upper hindquarters, tissue lacerations, muscle rupture, bite marks.

Soft tissue lesions are frequently associated with bone fractures, especially of ribs, spine and limbs.

Prey consumption appears to be characteristic in attacked animals, in humans being considered self-defence.

Domestic animal consumption by bear is supported by copious missing of soft tissues, bones and organs.

Mortality rate in attacked animals reaches 88.54%.

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