Wildlife Conservation
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Lecture - 21
Capture myopathy

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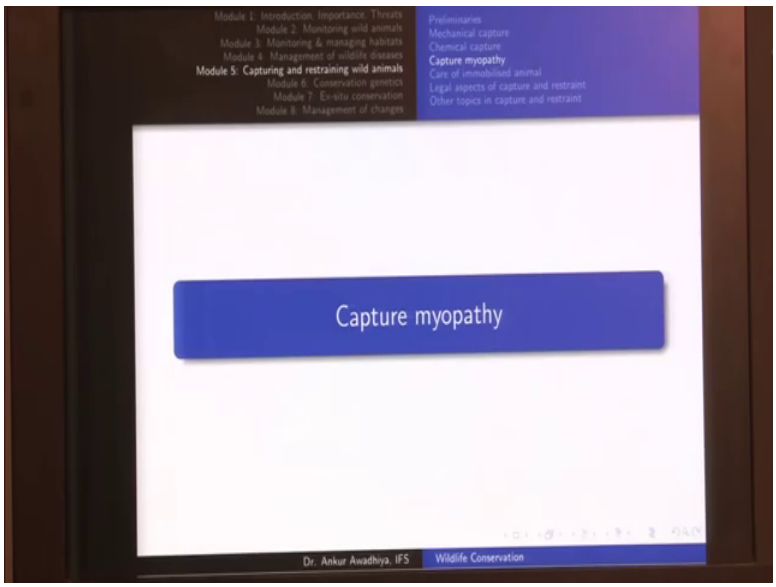

[FL]. There have been situations out there in the field, in which people went to capture an animal. And as soon as that animal was captured and died or in certain situations there was an animal that was captured, it was translocated to another area. And after being translocated after being released into another national park in a week or certain days, the animal died.

Now, these sorts of situations in which you have followed all the rules of the book, you have followed all the procedures, you captured an animal successfully I would say, and the animal dies after a short while, they have been quite enigmatic for a number of as conservation is. Later on, it was discovered that it goes by a phenomenon that is called capture myopathy.

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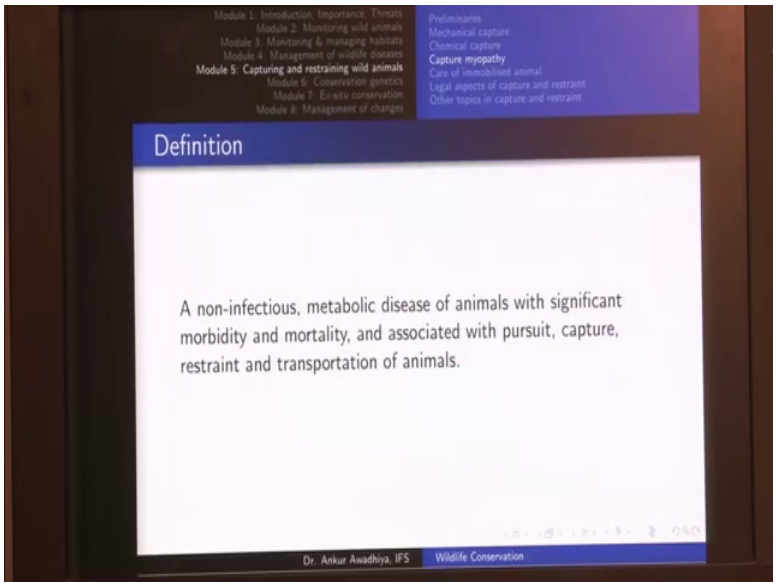

Now, capture myopathy is a non-infectious metabolic disease. So, non-infectious means that if an animal has it, it will not be able to transmit it to any other animal, it is not caused by any pathogen it is a metabolic disease. Metabolic disease meaning that, it is an error of metabolism. Now, metabolism is the process through which we take energies using food, we use it for a number our purposes, we use it for building of our muscles, we use it for carrying out all of our activities.

So, it is a combination of catabolism and anabolism. So, catabolism consists of all those processes in which there is some breakdown of the bodily tissues to get energy. And anabolism is a sum of all those processes in which energy is used to build up the body tissues.

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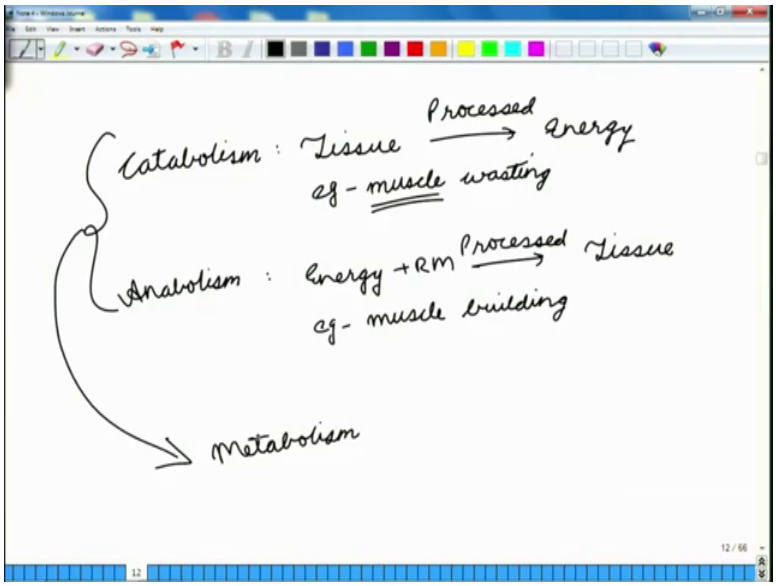

So, we have catabolism in which you have a tissue that is processed to give you energy. So, an example could be muscle wasting. So, you are not having enough food, the body is losing its resources at a are very fast paced. So, basically the body will breakdown muscle tissues to get energy. So, this is catabolism. Next is anabolism in which you use energy, when it is there, and some raw materials and these are processed to build up something specially a tissue. So, an example could be just as before muscle building.

Now, at all times there are some catabolic activities, and some anabolic activities that are going on together in the body. So, essentially in some areas there is some wasting of tissues that is happening, and in some an other areas there is a build of tissues that is happening. And a combination of both of these catabolism and anabolism goes by the name of metabolism.

Now, when we say that this is a metabolic disease of animals, it means that there is some problem with catabolic functioning or there is some problem with the anabolic functioning. So, it is a non-infectious metabolic disease of animals with significant morbidity and mortality. What do we mean by these, significant morbidity means that whenever such a thing happens, it will happen to quite a number of animals. So, essentially suppose you captured say ten animals and you would find that this disease is happening in all ten of them or say nine of them, even though this is a non-infectious disease. So, it has significant morbidity and also significant mortality.

So, when you have this disease that is occurring in ten animals, roughly all ten of them are going to die. There is roughly 100 percent mortality, when we have capture myopathy. And this disease is associated with pursuit, capture, restraint and transportation of animals. So, it is associated with chasing of animals, which is pursuit, you have captured it, you have restrained it, and you are transporting it, and this disease occurs during these stages.

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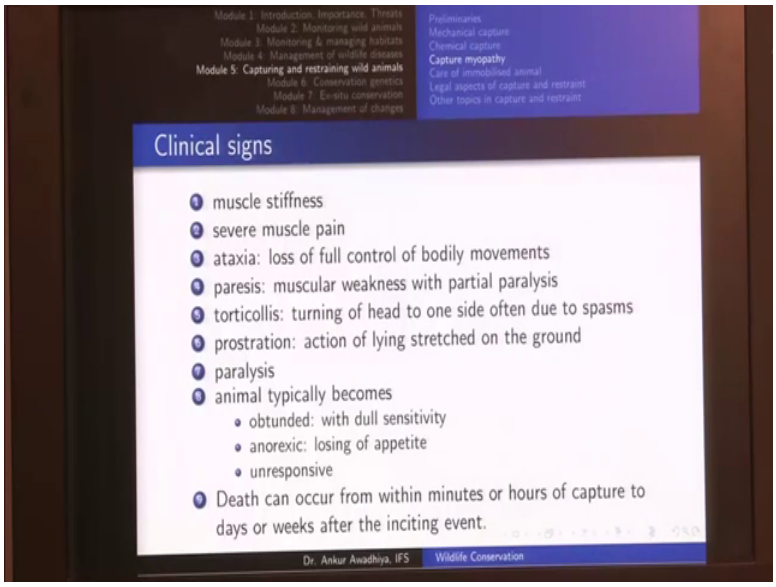

What are the clinical signs of this disease, so whenever you observe such mortality that is happening. In a number of cases, we would observe muscle stiffness just before that. So, the muscles of the body become extremely stiff. The animal suffers with a quite a lot of muscular pain, it suffers from ataxia. Now, ataxia means there is a loss of full control of bodily movements, so the animal will not be able to move properly.

There would be paresis; paresis is muscular weakness with partial paralysis. So, as you can observe there are a number of changes that are going on in the muscles. The muscles have become stiff, they are having pain, the animal has lost control of the muscles, and also there is some amount of weakness and paralysis.

Then we would see torticollis, which is turning of head to one side often due to spasms. So, in the case of muscles also, we are getting spasm and because of these spasms, the head is being turn to one side. Then prostration, prostration is the process in which an animal lies stretched on the ground. So, essentially the abdomen of the animal would be

touching the ground, and the legs would be spread in the front and the back, so that is prostration. So, again this could also be a symptom of a muscular damage. So, the animal is lying stretched on the ground. Then in the case of paresis, there was a partial paralysis, this could be followed by a complete paralysis of the body.

And the animal will typically become obtunded. Now, obtunded means that the animal will lose its sensitivity. So, for instance, if you go towards a wild animal, the animal runs away. But, when an animal has gotten this disease of capture myopathy, then it becomes an animal with a dull sense of its surroundings. So, even if you poke this animal, this animal is not going to move, it is not going to get up, it will become anorexic.

So, in the case of capture myopathy that goes on for some duration. So, essentially in the case of (Refer Time: 06:42) of the example in which we captured animals from one national park to another national park, and it died after 10 days. So, during those 10 days, we would observe that the animals has lost its appetite, it is not eating properly. Then it also becomes unresponsive to the surroundings and also to a number of stimuli.

And then death can occur from within minutes or hours of capture to days or weeks after the inciting event. So, the terms of pathology with we can say that this could be an acute phenomena in which you captured the animal, and it died within minutes or within hours of capture. So, it could be an acute phenomena or it could even be a bit chronic in which the animal takes a few days or a few weeks to die. So, to understand capture myopathy in more detail, let us look at the other terms that have been used for capture myopathy through the ages.

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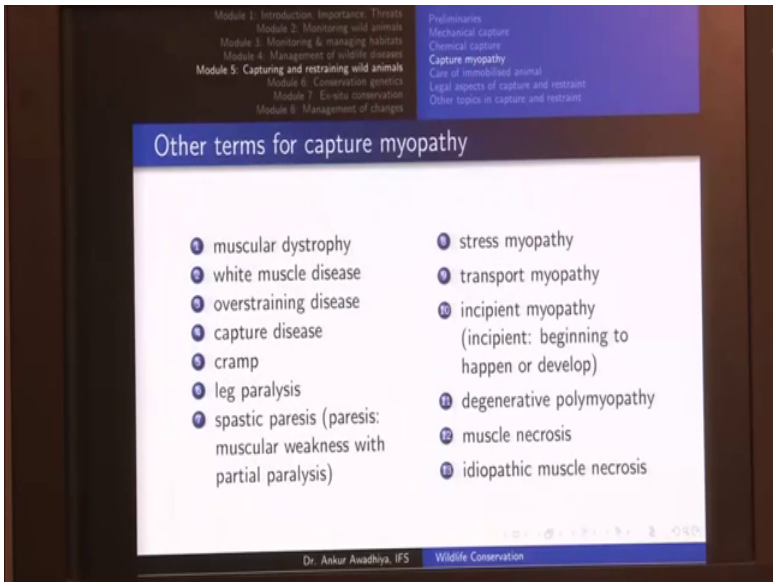

So, essentially all of these terms will give you a basic idea of what is happening in capture myopathy. So, it is muscular dystrophy. So, it is involved it involve muscles, and the muscles become dystrophic, which means that there is an abnormal growth or a breakdown of the muscles. In is also called the white muscle disease. Now, in the case of our muscles, they have a protein that goes by the name of myoglobin.

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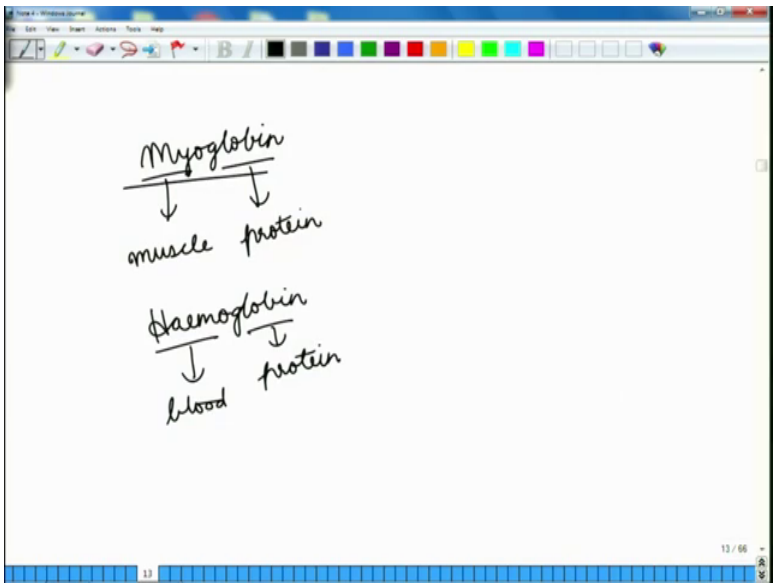

Now, myoglobin, myo means muscle, and globin is a protein, which is usually in the form of a very condensed molecules, so it is not a linear chain of protein, but it is

somewhat around it protein, which goes by the name of globins. Now, this term myoglobin is very similar to another term that we have read before, which is called hemoglobin. So, hemo means blood, so this is a globin protein that is found in blood. And this protein is extremely crucial for the transportation of oxygen and carbon dioxide in the blood. So, this is the protein that combines with oxygen that we have inhaled in our lungs. And then with the with this hemoglobin molecule, which is there in the RBCs, the oxygen gets transported to different tissues.

Now, myoglobin is another similar molecule, which is there in the muscles, and this also plays a very important role in the oxygenation of muscles. So, essentially there is a (Refer Time: 09:20) of oxygen, which is present in the muscle. So, whenever the muscles have to exert themselves, they have a source of oxygen that they can talk very easily and very quickly, and as in the case of hemoglobin. So, hemoglobin is a red colored molecule, and similarly myoglobin is also a red colored molecules. So, if you look at most of the muscles of the body, they would appear red in color.

Now, in the case of this disease, it is called a white muscle disease. White muscle disease, because the myoglobins are lost from the muscles, and the muscle appears whitish in color. Next is called overstraining disease. So, overstraining disease, because whenever the animal has over a strained itself. So, for instance, the animal was being chased by a one of art scientist or maybe it was even chased by one of the predators, so it has strained a lot. So, after a lot of strain, it will get this disease, so it was also called overstraining disease. And also capture disease, because it is normally seen when an animal is captured. It is also called cramp. Now, cramp is severe pain in the muscles. So, most of our athletes suffer from cramps after a very strain was exercise. So, at times this disease has also been referred to as cramps in the animals.

Then it is also called as leg paralysis, because again the muscles lose their function, the animal is not able to move its legs, so it was also called leg paralysis. It is also called spastic paresis. Now, paresis is a muscular weakness with partial paralysis, and it is combined with spasm, so it is spastic paresis. Then it is also called as stress myopathy. So, this disease occurs in situations of stress, and it is a disease of the muscles; myo is muscle, pathy is a disease. So, it is a disease of the muscle that is caused during or that is brought about by stress. It is also called transport myopathy again, because it occurs in a animal is being transported.

At times, it was also called as incipient myopathy. Now, incipient means beginning to happen or develop. So, this is a myopathy, it is a disease of the muscles that is beginning to happen or develop, when you have captured this animal or when you are handling this animal or when you are transporting this animal. Then it is also called as degenerative polymyopathy. So, again myopathy is a disease of the muscles, polymyopathy is that it combines a number of muscles, and it also combines a number of diseases altogether. And then it is a degenerative disorder, because there are some muscles that are breaking down or degenerating.

It is also called as muscle necrosis. Now, necrosis is another process in which the muscle loses its functioning, and it becomes a dead muscle. So, it is also called a as muscle necrosis, because the muscles are dying out. Then it is also called as idiopathic muscle necrosis. Muscle necrosis is what we have seen before, idiopathic means that the causes unknown. So, basically when we look at all these terms that have been used for capture myopathy, one thing is very clear, it is a muscular disease, it is caused by stress, and it leads to paralysis or necrosis of the muscles.

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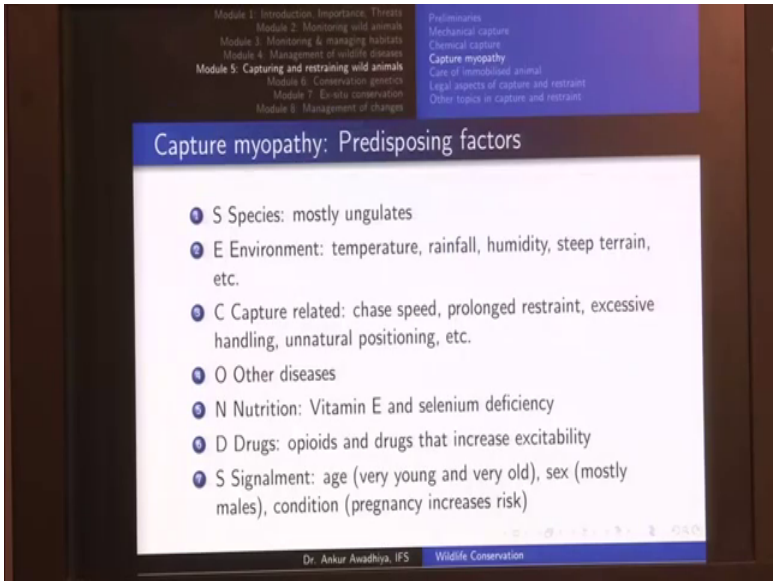

Now, when does capture myopathy happen. So, the predisposing factors have been have been written in this manner that they become a mnemonic. So, you can remember this by the term SECONDS. So, SECONDS S means Species, it mostly effects ungulates. So, for instance, if you are capturing and translocating a tiger, there is a very little chance

that you will get a capture myopathy in the tiger. But, if you are capturing and translocating say a gaur, a gaur is an Indian bison or say a chital, which is a deer or a sambar, then it is very likely that these animals may get capture myopathy.

Then it also depends on the Environment. So, as we saw before, it is acutely related with stress and environment also results in stress. So, essentially when we have high temperatures very high or very low temperatures, rainfall, very a drastic levels of humidity, a steep terrain and so on, then these factors also result in stress to the animal. So, environmental factors are also a predisposing factor.

Then it is also Capture related. So, when you are capturing the animal what was this the speed at which the animal was being chased was it put into a prolonged restraint. So, if there is a high speed, if the you have put this animal for a very long in a restraint position, if there is in excessive handling of the animal, which also gives it quite a lot of stress, or if there is an unnatural positioning of the animal for a long period of time, then these also become predisposing factors. And the animal will have a higher chance of getting the capture myopathy.

Other diseases. So, as we saw in a previous module on diseases. So, if there is any other disease that is already present in the animal, then it becomes a predisposing factor for any new disease, also in the case of capture myopathy. Then Nutrition, there is vitamin E and selenium deficiency in the animals. So, vitamin E and selenium act as antioxidants. And as we saw before, it is concerned with the loss of myoglobins. Now, in the case of myoglobins, when the animal has lost myoglobin, then it will not be able to oxygenate itself. So, there is some error of oxygenation also involved. So, if there are antioxidants in the body in huge doses, then there is a lesser chance that the animal will get capture myopathy.

Drugs. So, if you are using drugs like opioids and drugs that increase the excitability. Now, in the case of excitability, the animal even though it is having a paralysis in the body, it is able to sense everything its brain is working, and its brain is working very fast, it is hyper excited. So, in those situations also, the animal will feel more amount of stress. So, those drugs will also increase the chances of the animal getting a capture myopathy.

Then Signalment, signalments stands for the age, sex and condition of the animal. So, age, very young and very old. So, similar to in the case of any other disease, if we have adults, then they have a much better immune response is compared to very young or very old animals. Similarly, in the case of capture myopathy also, very young and very old animals are more susceptible. Sex, so mostly males are affected, because the female hormone estrogen acts as a protective factors in this case. And also condition of the animal. So, if a there is a pregnancy, if you have a female that has a pregnancy, then that female will also be at a huge risk.

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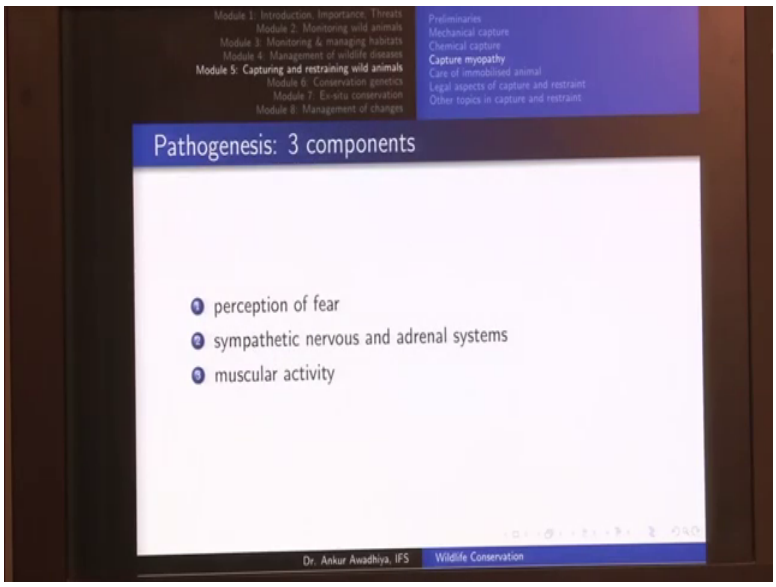

So, how does this disease progress. So, we can say that this disease is comprised of three components. Now, to remember what is happening, we can remember the famous dialogue of Sholay movie [FL]. So, if there is an animal that is getting a sense of fear, it might results in the death of the animal. So, this is what happens in the case of capture myopathy as well. The first stage is perception of fear. So, if the animal is extremely calm, if it does not perceive any amount of fear, then the animal is much more safe, but once this animal gets a perception of fear.

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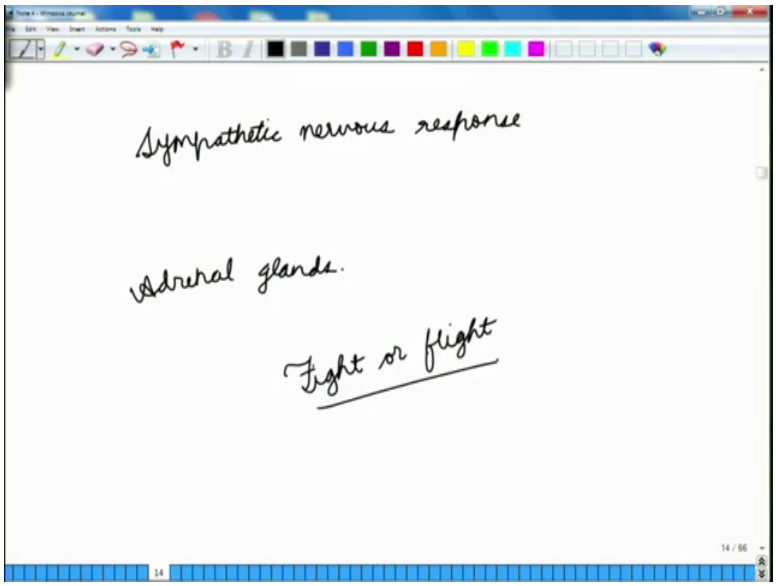

So, what happens when we sense fear, when we get a response that goes by the name of sympathetic nervous system response sympathetic nervous response and the role of adrenal glands. Now, what happens, when we suffer a situation in which we have a huge amount of fear. Suppose, you are walking in a forest and you see a tiger that comes in front of you, what would be the response, will the first thing is that our body prepares for a response that is known as fight or flight. So, it is fight or flight. So, essentially we are either going to fight with that tiger or we are going to run away.

Now, in both of these situations, we require a number of things that should happen in our body at the same time. So, for instance, our breathing speed should go up, so that we get more amount of oxygen. So, more amount of oxygen gets to our muscles, and so we are able to run fast, so we are able to fight the stress. Similarly, our heart rate should go up, because even when we are getting a larger amount of oxygen, this larger amount of oxygen needs to be pump to all the muscles, then we would want to have more amount of glucose in the blood. So, there would be a few hormonal responses in which the level of glucose in the blood would go up, because when we are running, then our muscles would be requiring more amount of glucose as a source of energy.

Now, all of these processes and a number of other processes, our level of excitement goes up, or peoples will dilate, so that we can sense our surroundings in a better way. So, all of these things happen by the action of sympathetic nervous system, and also the

adrenal glands, essentially the adrenaline is a hormone that is secreted by the adrenal glands, which will bring about all of these changes in the body. So, this is what normally happens, when we sense fear. And this is also what happens in the case of animals.

So, once the animal has perceive fear, then the sympathetic nervous system at the adrenal glands will take into action, release quite a lot of amount of adrenaline into the body bringing about all of these changes. And third is muscular activity. So, the animal starts running or even when this animal is kept captured in one place, then to the action of the adrenal glands would mean that all of these muscles are just clicking at their position. So, there is a lot amount of muscular activity that goes on. So, when we have these three components, then we would get capture myopathy.

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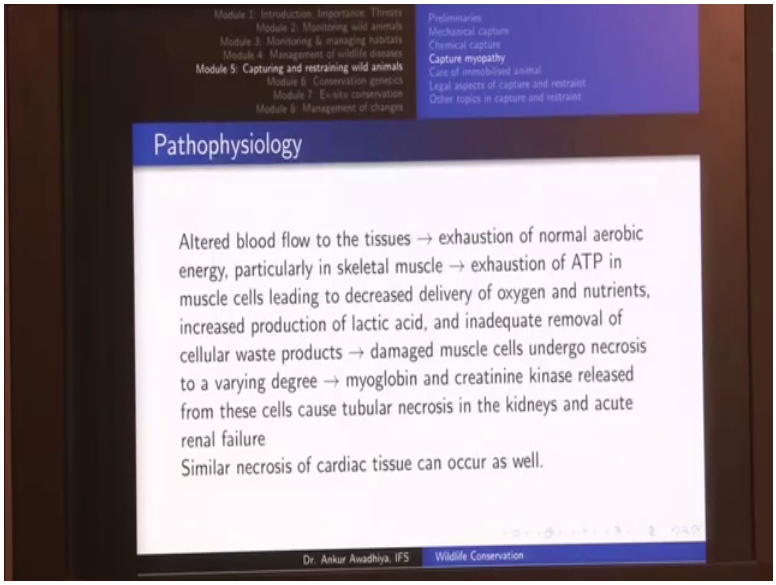

So, what happens during capture myopathy? So, there is an altered blood flow to the tissues, the amount of blood flow increases, and because the muscles of the body are extremely hyperactive. So, there would be an exhaustion of the normal aerobic energy particularly in the skeletal muscles.

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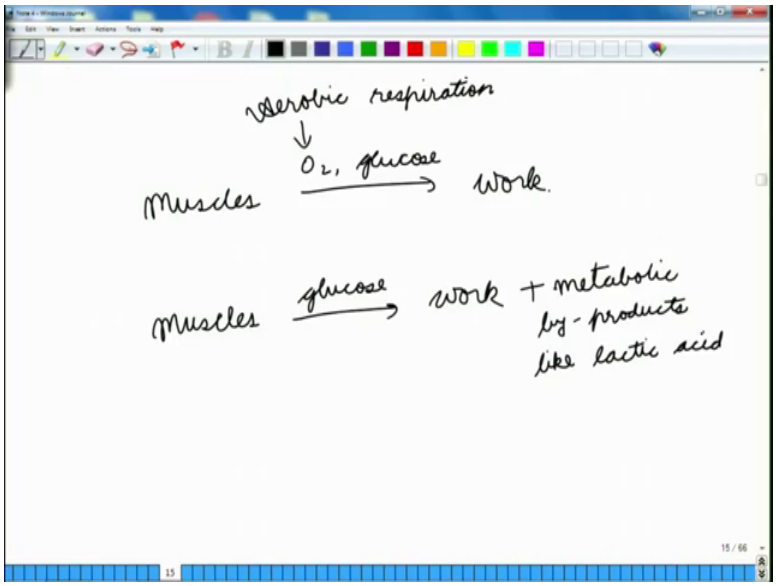

Now, what it means is that in most of the situations we have the muscles, and then you give them oxygen, you give them glucose, and then they would perform some amount of work. Now, this is known as aerobic respiration, because in this case, we are getting sufficient amount of oxygen into the muscles. But then, what happens when the activity of the muscles is greater than the normal activity because of which it requires much more amount of oxygen. So, our requirement of the muscle is greater than what the circulatory system can provide to the muscles.

So, in those cases, we would have muscles that would use another pathway. Without oxygen, and then they would use glucose to perform work, but then it would also result in certain metabolic by-products like lactic acid. So, a common example is that when you are walking, so you can walk for a very long distance, and your muscles will not feel any amount of pain, because, your muscles are getting oxygen, they are using glucose, they are doing the work. And then all the all the by-products, especially carbon dioxide are getting flushed out from the system.

But then, if you go for a sprint if you go for a very fast running, so in that case the muscles require much more amount of oxygen, and that much amount of oxygen is not being provided to them by the circulatory system. In that case, the muscles will shift into an anaerobic respiration that is respiration without air without oxygen. And in that case, glucose is converted into energy, but it also releases lactic acid as a by-product. Now, if

that lactic acid accumulates in the muscles, then it also leads to a sensation of pain in the muscles.

Now, in the case of a capture myopathy, we have exhaustion of normal aerobic energy particularly in the skeletal muscles. So, skeletal muscles are the voluntary muscles, so they are the first one that are affected. And so, the body has shifted from an aerobic respiration into a an anaerobic respiration. Then this would lead to exhaustion of ATP in the muscle cells leading to decreased delivery of oxygen and nutrients increased production of lactic acid and inadequate removal of cellular waste products.

So, essentially in the case of aerobic respiration, it releases thirty eight molecules of ATP per molecule of glucose. But, in the case of anaerobic respiration, we have only eight molecules of ATP. So, essentially this process is like 20 percent as efficient as in the case of aerobic respiration, which is why we do not normally use it as a default mechanism, but because in this case, the skeletal muscles are extremely active.

So, they have exhausted all the ATP or the energy currency that is there in the cells. And after this, they would be a decreased delivery of oxygen, and the cells will shift into anaerobic respiration, which generates lactic acid and waste products, and because the level of blood circulation is not that fast, these cellular waste products will not be removed at a very fast pace.

So, this these a metabolic byproducts like lactic acid, they go on accumulating in the cells, which then damage the muscle cells, and they undergo necrosis to a varying degree. So, the muscle cells are damaged because of lactic acid, and then they start dying. Now, when they start dying, then myoglobin and creatinine kinase are released from these cells and cause tubular necrosis in the kidneys and acute renal failure. So, what is happening is that when these muscle cells die, the myoglobin that was there in the muscle cells, it gets released into the blood. Myoglobin and creatinine kinase, which is an enzyme. So, both of these get released into the blood, and then they are taken to the kidneys for removal.

Now, kidneys can remove a small dose of myoglobin. But then, when it becomes too large, then it also starts causing damage to the kidneys. So, it results in tubular necrosis. So, in the in the tubules in the in the kidneys, we again start seeing cell death, and at least to acute renal failure. So, acute means that, it is a very fast acting failure of the kidneys.

And then similar necrosis of cardiac tissue can occur as well. So, basically the heart tissues will also be showing simulation. So, let us see how this looks in the field.

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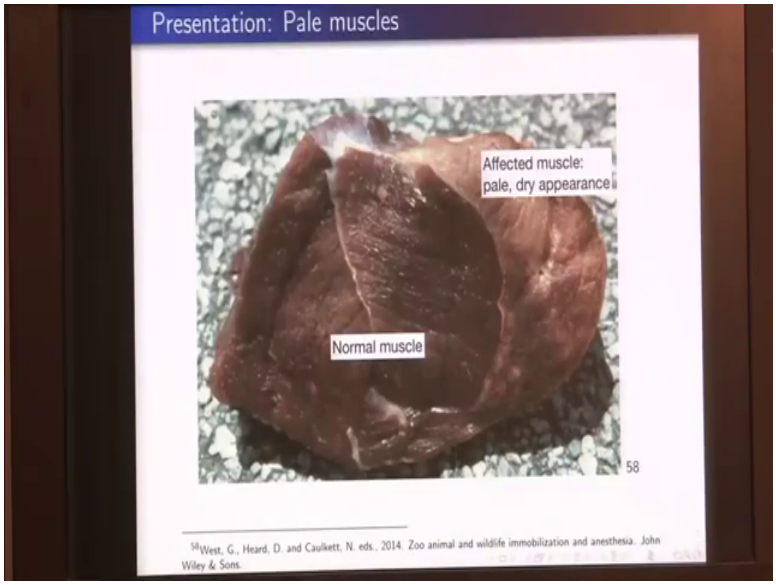

So, this is a normal muscle. And as you can see it is a very dark red in color. But, when this muscle is affected by capture myopathy, it would have this affected muscle, which becomes pale in colors. So, this is dark red, this is very light in color, and it gives a very dry appearance. So, this looks very wet in appearance, this is looking very dry in appearance. So, the first presentation, when we go for an autopsy of the animal, we would start observing pale muscles. And most of these muscles would be these skeletal muscles or the voluntary muscles.

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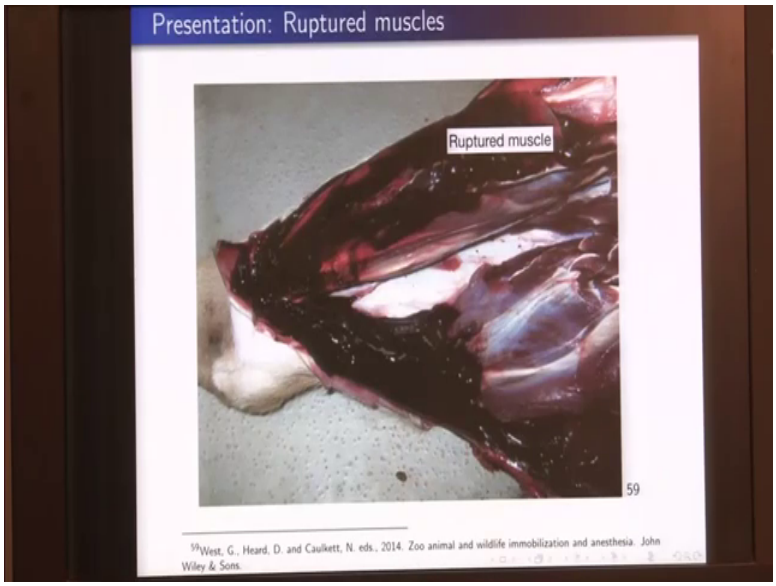

In certain situations, we would also observe the ruptured muscles. So, these muscles, so like this is a muscle. And this muscle has ruptured out again, because it has accumulated quite a lot of waste product, it has suffered excessive amount of necrosis, and so it is strain quite a lot of rupturing as well.

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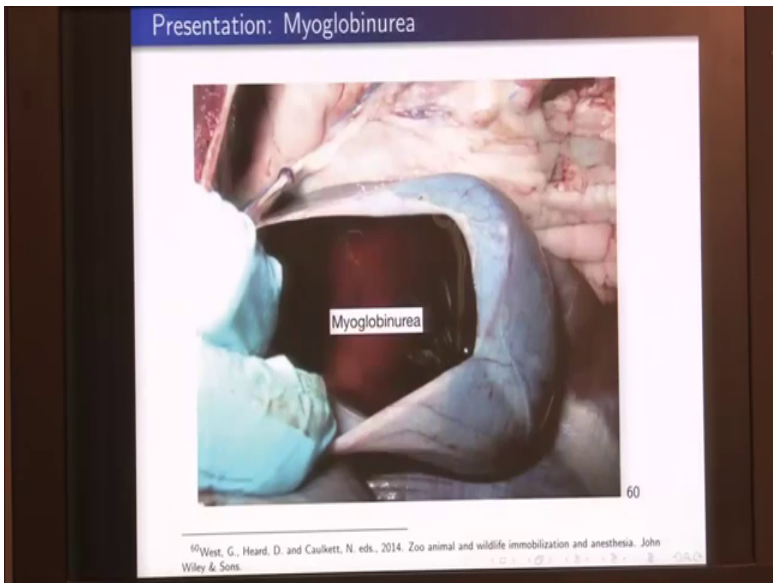

Next, we would observe myoglobinurea. It means that this is the urinary bladder of the animal. On the inside, we can observe the urine of the animal. And this urine has become extremely red in color, because this urine is now full of myoglobin. So, this myoglobin

was released by the muscle cells, it went through the kidneys, and then it has gotten into the urine. So, it is presence of myoglobin in the urine.

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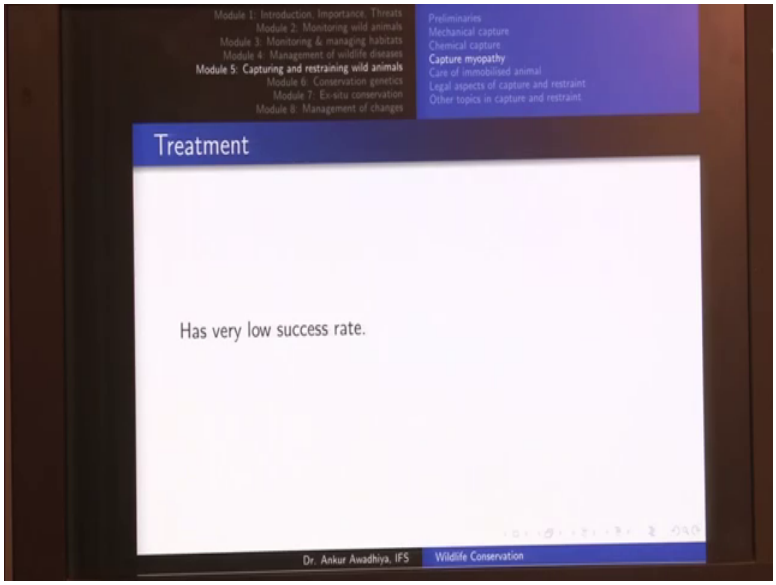

So, how can we treat capture myopathy. Will the sad state is that this has a very low success rate. So, essentially if you have an animal that is suffering from capture myopathy, there is very little that we can do. So, the best option is to avoid it.

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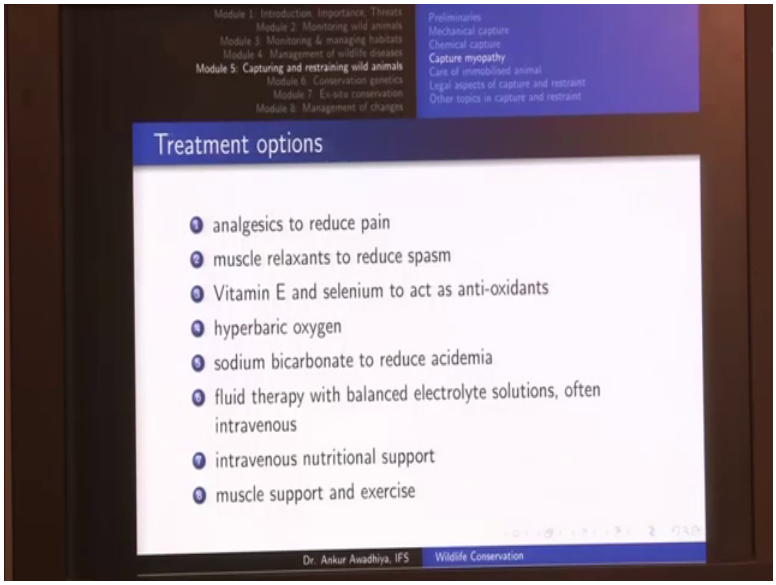

But still, what are the treatment options available. Suppose, from extreme amounts of pain, we give the animal some analgesics. Now, these analgesics are not going to cure the

animal, but it is a human approach to reduce the pain in the animal. It also give some muscle relaxants, because there are very serious spasms that are going on in the body and muscle relaxants reduce those. Before transporting the animals especially in a zoo condition, we can give them vitamin E and selenium to act as anti-oxidants. And even when there is an animal that is showing some signs of capture myopathy, we can give it vitamin E and selenium, but again the prognosis is not very good.

In certain situations, we give it hyperbaric oxygen, which means oxygen at a high pressure, so that the waste product of anaerobic respiration do not form, and an even those that are formed are flushed away. We give it sodium bicarbonate to reduce acidemia both in the blood, and also in the urine. Then we also give it fluid therapy with balanced electrolyte solutions, often intravenous. So, in the case of fluid therapy, you are giving it quite a lot of electrolytes in water. And in that case, the blood becomes tend out, and it is also helpful in removing the waste products from the body, because the kidneys will starts functioning more, because they have larger volume of blood to be processed.

Next, you also give it intravenous nutritional support, because as we saw in the case of capture myopathy, the animal would start showing symptoms of anorexia, it would stop feeding. So, we give it intravenous nutritional support. And also some amount of muscles support and exercise. So, if there is any damage to the muscles, we try to overcome it by giving some supportive exercises.

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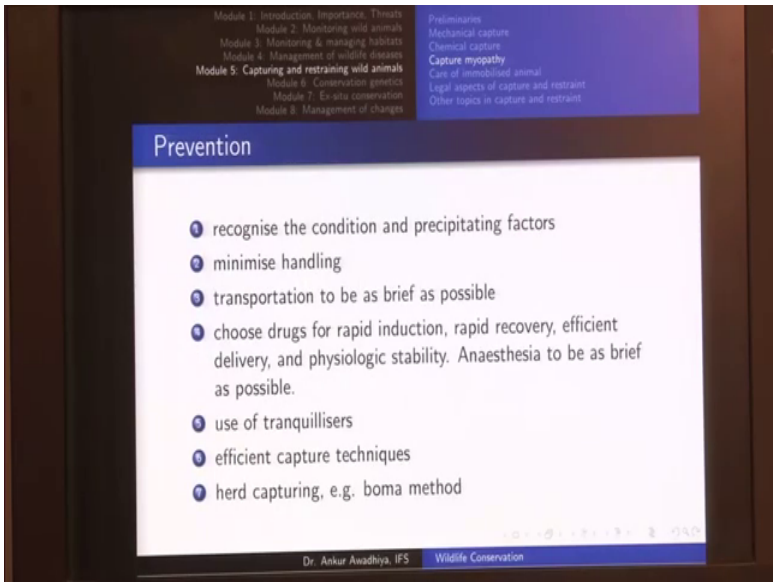

But then, the best way is to prevent this situation from happening. And one way of preventing it is that you first of all recognize that your animal can suffer from capture myopathy, what are the precipitating factor, so that we can remove them or minimize them one by one. The most important thing is to minimize the level of stress that the animal suffers from, to minimize the fear in the animal. So, one you can minimize handling. So, if there is less amount of handling, the animal will suffer less amount of stress and less amount of fear.

When we are transporting the animal, this transportation should be as brief as possible, do not put this animal into a transportation cage for a very prolong period of time. Then when we are using drugs for immobilization, choose drugs for a rapid induction, rapid recovery, and efficient delivery and physiological stability. And the anaesthesia has to be as brief as possible.

So, essentially if you have darted an animal and this dart takes 2 hours to act. So, in this period of 2 hours, the animal gets a sensation that it is losing control over its body, because earlier it was moving fast, now it is getting a feeling of sleepiness, its head is getting high. So, in those situations, the animal will start getting a sense of fear, because these are things that also happen, when an animal gets a snakebite for instance. So, whenever we are choosing drugs for immobilization, these drugs have to be extremely fast acting, so that the animal does not get this sense of fear. Even when you are recovering this animal from a drug, then those antidotes should also be fast acting, because the animal should not be in a condition in which it feels that it has lost control over its body.

Then delivery mechanism has to be extremely efficient. And the drug has to have a physiological stability in the body. Anaesthesia has to be as brief as possible, so that the animal suffers as less amount of stress as possible. Then whenever we are transporting the animal, it should be given tranquillizers. Tranquilizers are those drugs that produce a calming state in the body. So, even though this animal is put inside a crate, when it has been given tranquillizers, it will feel easy, it will feel calm; it would not get a sense of anxiety. Next, we should use efficient capture techniques. So, the capture techniques should not be those that provide a lot of stress to the animal. And also we can go for herd capturing like the boma method.

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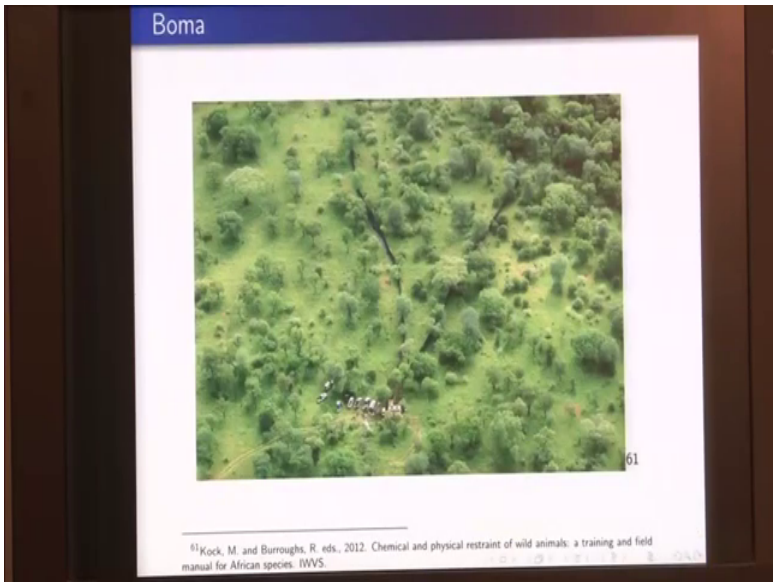

Now, what is herd capturing? Now, in the case of herd capturing, this is one example from Africa. What we do is that we create a large size funnel, so this funnel could run for kilometers at a stretch. So, there would be holes that are kept in the forest. And on those holes, we have attached a plastic sheet much like what we saw in the case of a pitfall method trap. But, in this case, these plastic sheets will be mostly black in color, and the height would be close to around 6 to 8 feet, so that the animal is not able to jump over these.

And when we are chasing the animals in case of chasing a single animal, we would chase the hole of the herd. So, the hole of the herd will come into this area. Now, once the animal has come into this area, we would start closing of the gates here. So, we would be having some gates that are made out of say fabric or plastic. So, essentially they become just a visual and a psychological barrier for the animals. But, when we close these gates, then the hole of the herd is confined into this triangle. Then we would start chasing it into this area towards the end of the funnel, and then will the herd has reach here, we would close a gate here as well. So, essentially we are concentrating all the animals into a smaller spot.

And when the herd has reached to this point, so here we can see a number of vehicles that have been lined up. Now, these vehicles would be standing here, and these animals would go as a herd into the vehicle. And once they are inside the vehicle, they would be

a very less amount of light that is given to the animals. So, the animals would be given a very less amount of stimulus from the outside. So, this whole complete herd is out there in a compartment that is very dark, and which is not having quite a lot of sound, but then because all of these animals are kept together. So, some amount of social cohesion also helps the animal to reduce the amount of stress.

So, if you had suppose taken out a one single animal from the herd and kept it into in an enclosed box with a lot of stimuli light or sound, then that animal would suffer from quite a lot of stress. But, when the whole herd is together, and the amount of stimulus is very less, so the animal does not get a huge amount of stress. And in those cases, we have observed that capture myopathy can be prevented by as much as 100 percent.

So, for instance in Madhya Pradesh, when we are now translocating Barasinghas from one location to another location, we are making use of the boma technique. Now, in the boma technique, the whole herd of the Barasinghas has been has been put inside a truck, and then it is moved away. So, in those situations, the animals do not get a feeling of stress, and the animals have a very good rate of survival.

So, in this lecture, we observe what capture myopathy is, it is a condition in which the animals die out in an acute or a chronic fashion, especially just after or maybe in a few days after they were handled or captured or restrained or translocated or transported from one place to another place. Now, this is a metabolic disease in which the muscles rupture out in which the muscles start getting necrosis, the cells start dying. And the myoglobin is released into the blood bloodstream, and then that myoglobin gets into the kidneys, and it is also start damaging the kidneys.

Now, we observed how do we diagnose whether a case of an animal death was because of a disease or I mean whether it was because of an infectious disease or whether it was because of capture myopathy. Now, in our previous lecture, we had seen that whenever we are translocating animals from point a to point b, we normally keep them in a quarantine facility just to observe whether these animals are bringing any new pathogens into the system.

Now, when the animals are there in the quarantine facility in the say for say a 15 days, and these animals died out at day 10. So, how do we how do we make sure whether these animals died because of an infectious disease or because of capture myopathy. So, we

will looked at instances in which the muscle appears extremely pale in which we see signs of muscle rupture, and we also seen the presence of myoglobins in the blood.

Then we also looked at a treatment options available for the animals, so while these treatment options are not extremely effective to prevent death. But in most of the situations, they are effective to prevent the amount of suffering or to reduce the amount of suffering that the animal is getting. And then the best way to counter capture myopathy is to prevent it by say using minimal amount of handling of the animal, using efficient capture techniques, using those drugs, that act very fast, those antidotes that also act very fast. And preferably going for a herd capture techniques, which is the boma technique. So, that is all for today.

Thank you for your attention. [FL]