00:00 I: What kind of species are these?

00:02 A: They are rhesus macaques of Indian origin, from the Indian subcontinent.

00:07 I: Why is it these used in Medical Research?

00:12 A: They are very useful for certain types of work. They are closely related to humans as everyone knows. They have a lot of similar pathways, their eyes are very similar as well as their brains. They have a central fovea, so they are used for example in studies of macular degeneration and they have a transposable deep thumb. They have similar pathways in terms of hand movement, so people study those as well. They are also used for vaccine work; AIDS, TB, things like that they are important for.

00:58 I: How many individuals are there in this unit?

00:59 A: About 240

01:10 I: Are they just used for research in the UK?

01:13 A: Yes, we have on one occasion supplied animals for breeding purposes outside the UK but basically the function of this unit is to supply animals for UK Academic Research. That's what we do.

01:32 I: Are all of the animals used for research in the unit?

01:37 A: This unit's primary function is breeding, there are limited amounts of research, simple research that goes on here; behavioural type work for example. The function really is production, we work very closely with the scientists in the institutions that we supply to ensure that the animals are well prepared for their subsequent use.

02:08 I: Can you give some examples of the kind of experiments that are done with these animals?

02:17 A: I mentioned the macular denegation work, macular degeneration is a condition very common in humans causing blindness. There is work which is really quite close to the clinic going on with some of these animals, developing techniques for treating that condition.

02:35 I: And what will the experiment involve?

03:06 I: Can you give an example of one of the experiments that's done, so for example with macular degeneration research?

03:15 A: Macular generation is a problem with the blood supply to the fovea which causes blindness. They have been doing work involving a laser surgery technique to re-vascularise the area of the retina. It's the sort of technique that if applied to humans would be an out-patient thing. You would come in for the morning, have the surgery and then just go home,

all done by laser. They have been developing techniques that may well be, about to be applied in humans.

04:17 I: Can you imagine a time when we maybe won't have to use Macaques?

04:22 A: Yes, it's probably a long way away. Unfortunately it would be nice if didn't have to use them. I do believe genuinely they should only be used when it's absolutely essential. That time could well come, in theory at least but not in my life time and not for quite long time I suspect. The animal model cannot be replaced by computers at this stage. Although there is a lot of computer work done for this type of work too.

04:53 I: After they have been researched on, do they ever come back here?

05:07 A: Yes they do. In fact Jim who is sitting there has been used for research. He was used for cognition type studies, simple studies. I don't know exactly the tasks that he carried out but touch screen type tasks or something like that. When he completed his studies he came back here and he has been happily running a breeding group ever since. He is not alone, there is quite a few that have come back. For the more invasive type studies it's not possible for animals to come back, they may need to be killed at the end of the study. If when the researchers have finished with them and they don't need them and they are in good health, then yes it's something that happens quite regularly actually.

06:16 I: After the research has been carried out, do they ever come to the unit here?

06:19 A: Yes they do. They have to be in good health and they have to be checked by Vets before they come back. Jim is an animal that was used for cognition studies and he came back quite a number of years ago now and has been happily breeding ever since. Nobody wants to put these animals down unless they have to, clearly if they are in good health it's quite a nice environment for them here. As far as we can tell they are happy and we do the best to ensure that they have the ability to fulfil their behavioural needs. It makes sense.

06:55 I: What happens to the animals that are no longer needed for research?

06:59 A: There are a few that come back here. It may be that at the end of the study that they have to be killed because they need to take tissues or something like that. We have breeding animals here too, eventually they will reach the end of their life. They may not be breeding, they may develop conditions or problems and need treatment. There comes point when they have to be put down as with your pet at home potentially.

07:33 I: How is that done?

A: It's done by an injection, on overdose of anaesthetic. When we do have to unfortunately kill them, then we would supply tissues to scientists that need them to make sure that we make the most use of the animals that we have here.

07:57 I: Does anyone have independently check to see that the animals are being look after properly.

08:08 A: We have regular inspections from the home office so that's their role. We also have oversight from an ethical review process and we have people who come from various parts of the country to meet here and discuss how we are handling the animals, their welfare and what we might do better. We do get advice from various sources, we do strive to do our best to care for them as well as we can, it's very important.

10:57 I: In this room here, how many macaques are there?

11:00 A: There are just actually 5 animals in there, it's quite a small group. The group size in the colony ranges from that to about 12 breeding animals plus offspring. Macaques have in the wild as well as in captivity, have a very strong social hierarchy. It's essential in maintaining good welfare. The male is the overall in charge CEO if you like of the little organisation and he has an alpha female who is executive director and then there is a chain of command going down. That hierarchy is inherited, not necessarily genetically but the alpha female, her offspring will eventually form the alpha female of the group. It becomes a stable thing going on through the generations and that stability generates good welfare. The animals know their positions in their society and will maintain that. Where that breaks down then you will get an increase of aggression, fighting, squabbling, not that different to groups of people. It's actually a great way of trying to manage the colony. We try and encourage and stabilise the groups in that way. We will retrain female offspring within the colony for subsequent breeders.

12:44 I: Are individuals ever moved between colonies and if so why?

12:49 A: For logistical reasons there can be reasons. If for example the group isn't stable or isn't as stable as one would like there can be increased aggression, so we would have to take animals out for that. It's not the situation we would ideally want but it does happen, these animals can be quite aggressive towards each other and we have to manage that, so occasionally we have to take animals out for that reason. As you can imagine the group size would potentially get bigger and bigger, these rooms we think are ideal for about 12 breeding females and a male. Under the new directive we could have more than that, but we think in terms of managing a stable group that is about right, so ultimately one would have to split up groups for that reason too. Also, of course the offspring have to be taken out at some point because they are going to go off to institutions for experimental use.

14:03 I: Are these colonies mimicking the way that these animals live in the wild?

14:09: A: In so far as it is possible yes that is what we are trying to achieve here. There are distinct differences, although we have got what looks like quite a lot of space, there is always more space in the wild. There is more space to flee and escape if you need to, if you are being aggressed by one of the other animals in the group.

14:41: A: The other thing in the wild is that what would tend to happen is the males would go off and they wouldn't stay within the group, they get expelled. Their life expectancy in the wild might be less because they have to go and fight to find themselves another group.

15:30 I: What happens if there is fighting within the colonies here.

15:34 A: That is one reason why we need a good stable hierarchy to minimise that. If there is fighting the animals need to be able to escape and clearly within a room, a facility there is less room in this place to escape than there would be in the wild. That is one reason why we have things like the enrichment and the tubs and the visual barriers. If they want to get out of sight of somebody that is not very happy with them they can do that, they can go through the little pop hatches into the next room. It's important that we have as stable a group as possible to minimise that. Compared to the wild we don't have as much space but then we probably have fewer threats too.

16:39 I: In the enclosure they have got some balls and some ropes that they can swing on. Why is that there and what do they do?

16:47 A: It's environmental enrichment; which is really actually providing the facilities for the animals to behave as naturally as possible and fulfil what their behavioural needs are. So we have things for them to climb on, in the wild they would climb on trees, they would swing on things that flapped around like vines or something, we have the fire hoses. We see them using them, how we actually asses how much they actually need them, it's quite difficult. The technicians do know their animals very well. They have known these animals for years, some of them are 20 and they have probably been in the colony longer than most of the staff. The staff know them all individually, they can tell if they are in a good mood or when they are in a bad mood. They will sometimes say, 'oh so and so is in a bad mood today'.

17:37 In terms of the enrichment, we have got a lot of bedding. That's not just to soak up urine and faeces. It's actually there to provide enrichment, so the straw and shavings mixed and the animals will pick around in that. We also feed them foraging materials which are mixtures of various things which have been pulled together like lentils and various types of seeds and herbs. There are tiny little particles which you would never think they will be able to find but they do find them. Those just get thrown in and the animals will spend hours foraging. That's very much a natural behaviour too that they would display in the wild, they will look for food and they would look on the forest floor and we can provide that here. Clearly, it's something that one can't help but when watches to think that they like it. We know it's a natural behaviour, we do make a certain amount of assumption because we are allowing to fulfil a natural behaviour but actually they like it. I think that it's a general accepted theory that allowing those behaviours to be expressed is very important. We have to do as such as we can along those lines despite the constraints that we have of captivity which is primarily space.

19:00 I: Do you work with behavioural psychologists to assess their behaviour?

19:06 A: We do work with scientists to some extent on assessing behaviour. It's something the unit could do more of and we want to do more of. We have got a number of potential projects coming up, funding through the NC3R's, where scientists are going to come here and carry out programs of research; assessing behaviour in different circumstances and how perhaps animal behaviour can be managed better, and the animals can be managed more effectively in the captive environment for their benefit. Having an animal that is very fearful and afraid is not going to be good for carrying out the sort of tasks that some of these scientists want, like a touch screen task where they have to select from options and then get a food reward. If they are fearful and stressed they are not going to perform, so they need to be behaving as naturally as possible and be relaxed.

20:15 I: NC3R's

20:17 A: The national centre for the 3R's. They are tasked with encouraging and supporting refinements and reduction, replacement of animals in research. Primate usage may be one of the smaller areas but it's also one of the more sensitive. There is quite a lot we can do to improve the welfare of the animals in the captive environment and they clearly want that to happen, we can work with them to achieve that.

21:03 This is a group of youngsters, from a year. Sadiv is 3 years plus and we have them in between. The tattoos are on an annual basis so we have a letter for each year.

21:32 I: Is the hierarchy established already?

21:34 N: No it won't be established with the younger infants and kids. That establishes as they grow older. Hierarchy is inherited within groupings, maternally. It's very strong. These guys have been removed from mums and they will go into compatible groupings and they will grow together.

22:14 I: Packed together in this colony for the length of time that they are at the unit.

22:19 N: These guys will be models for science for future, that's why they were removed from mums. These will be prepared for use in the future.

23:25 I: The whole process start within the adult grouping, so from birth they have contact with us. That doesn't mean hands on contact but that they are aware of us. When they transfer from here we have core staff that follow them through and continue that interaction and habituation.

23:54 I: Do you ever feel that they are scared of you or do you work up from the contact?

23:59 N: We work up from the contact. I would not expect a monkey to be scared of us, that is not a useful situation at all and wholly inappropriate.

24:20 I: Are any of them related here? Are there brothers and sisters?

24:23 N: Yes, Vice and Versa are brother and sister. The rest of them aren't brothers and sisters, they are not half siblings.

25:29 N: That's normal, that somebody being told off, that's just a grab and contact.

25:47: N: It's quite a big deal for them when they are removed from their native grouping.

25:53 I: They are not so keen on these ones.

26:21: N: That was a door squeaking, so something is happening. Anxiety goes up, goes up high, asses risk and come back down. With these being youngsters that's a very normal behaviour, normal and natural thing. It's how quickly they come back.

27:07 N: And they all progress at different stages.

32:23 I: What are the noises that they are making at the moment?

32:25 N: Cooing noises, they are reassurance and they are positioning noises.

32:30 I: And the squeaking?

32:31 N: The squeaking, that could be a result of tension or a re-directive threat. You see Sadiv here, she is pushing some of them around and keeping a pecking order in place as in hierarchical one.

Hierarchy at this point is generally reinforced through eye contact and body language. Further down the scale at grab or place.

33:06 I: Do they ever make noises using their surroundings and does that ever mean anything?

33:11 N: Yes, they will use buckets and things to bash against walls, more noises more attention. I'm here, don't react just ignore it, it'll be fine. These guys are like young kids, they are teens. That was just something that he didn't know how to respond to. The appropriate response, you can see him, he is watching Sadiv. These guys are like us they are learning throughout their lives. He will allow her to take, she is dominant over him. He is not going to intervene.

34:38 I: They do recognise if you call their name?

34:51 I: You have given them names and can they recognise the call if you were to call their name?

34:56 N: Not at this point, we need to do some work with tagging with these animals. Everybody does their own thing, so that can be quite hard. Depending on the user and their requirements, that's when we will have the feedback into what they want so that it can be put into place here. If they are going to use names and tag them, then that is something we can do. Certainly from a training purpose it's far better to have a name. I find it quite

aversive to have a barcode. I would want to see a relationship. The first thing you do when you meet somebody, hello and there is always a name afterwards. It's that very first start. Unique names for unique peeps.

38:24 R: So tell me what this is about.

38:27 N: This is blackcurrant. We would use it for contact and reinforcing positive contact with us. We would also use it if we had to treat an animal with antibiotics. Rather than using a needle and syringe, we would be able to put the antibiotics in this and give it to them, making it a pleasant experience. No need to inject and remove them from their social grouping.

39:49 I: How is this colony different?

39:50 N: This is a breeding group. This is Jim, he is a breeding male. We have one male with multiple females. We have the odd females around, we have got Gracie, Beth and Biddy. These are far more mature. Jim is 21 this year. These guys are where it all starts. These guys produce the offspring and the kids for scientific use. This is where our interaction with them starts from day one.

40:36 I: What are you feeding them?

40:39 N: I've got cereal in my hand here. I don't like to give them too high a calorie reward. When we are training we have a wage. If we are training we increase the wage for doing something that we want them to do. At the moment this is just a positive reinforcement and a high, it allows me to check them and it makes it a positive experience for them.

41:15 I: Tell us about Jim.

41:17 N: Jim I met a long time ago. I worked or another company and he was issued from the colony as an experimental model. Using a scientific program of which I was part of, I was a supporting part so I have performed procedures on Jim, consciously.

41:43 I: What kind of procedures? What was involved?

41:47 N: That would have been dosing a drug compound and also withdrawing blood on a routine basis. I would also have been helping the Vets, supporting them during a health screen.

42:03 I: Has your relationship that you have gained through feeding them like this, does that help when it comes to the research?

42:10 N: This was started a long time ago, so when I first met Jim, he was a little over a year old and we started a program of interaction with us, as human beings. We wanted the contact and we wanted the cooperation. To do that we needed to gain trust and respect and have a

honesty about what was going to happen and also that supported training events that we used within science at that point in time. It allowed us a closer contact and awareness.

42:56 I: Do the monkeys miss one another when one of them is removed from the colony?

43:01 N:That's a hard thing to answer, I would say yes they do. Any removal from the grouping is missed. They are a social animal so everyone has a role to play within that social group.

43:27 I: Do you have favourites within the colony?

43:32 N: I do. Everyone is a favourite to a degree but I've known Jim for about 20 years so I guess Jim is my favourite

43:46 I: What is the life expectancy of these monkeys?

43:49 N: Within captivity it is far more than it is in the wild. These guys can easily live until 25. We have a great veterinary team, we have no issues from predation which they would have in the wild or parasitism, injuries, we can overcome all of that and disease and we do , hence they do live a lot longer. I doubt if I could speak freely, that Jim would actually be around if he was in the wild at this stage in his life.

44:33 I: How often is their health checked by the vet?

44:37 N: We have 24/7 veterinary cover. If there is any problem that we see or we have a concern about we will have a vet attend immediately. We also perform an annual health screen so we check serology, bacteriology of the animals to make sure that they are healthy and that they are fit. We treat if they are unwell. We need physically healthy animals for science, we need psychologically healthy animals for science as well.

45:22 I: What kind of illness might they get living in captivity? What are they being treated for?

45:28 N: They will fight in captivity, so they will get treated for fight wounds for example. As they get older they suffer from the same or very similar things that we do. On occasion Diabetes, Arthritis. We would take care of them and make sure they stay fit and healthy.

46:09 I: Are you able to see when they are happy?

46:16 N: Happy is a hard one, content yes that's easy. I can certainly tell when they are grumpy, that's for sure.

46:34 I: How do you know when they are grumpy?

46:37 N: Their facial characteristics change, so does their behaviour, body posture , stance locomotion, the general atmosphere in the room. When you walk into the room and there

is this kind of awful eerie silence. One member of the group being unhappy or grumpy that can change an entire atmosphere in the room.

47:03 I: The animals that have come back here after having been involved in research, do you think they have an equal quality of life?

47:14 N: I think they do, yes. I have to admit that when Jim was returned to the colony after use, I use to think as a technician, I wonder how he is doing, I wonder what he is doing. Is it enough to being in breeding? Quite clearly it is.

47:41 I: What do you enjoy most about working here, what is the best bit about it?

47:47 N: There are so many things that are good for so many different reasons. Having the right models for the scientists that you know are going to work well is one. The pleasure of having a relationship on a daily basis with these guys is another. It's unsurpassed actually.

48:19 I: And what about the worst thing, what don't you enjoy?

48:23 N: I don't think that there is anything I don't enjoy. There are certain events that happen where you kind of walk a tight rope. For example, we had a caesarean section which is a rare occurrence here, very rare. We had a vet attending and you have an expectation, you know that in reality the baby may not survived. Everyone was there, everything was being produced and we all expect the baby to live and that exactly what happened one day on this event. The first time I'd ever seen it in 25 years, the yay in the room when the baby came out, the baby was alive, everyone was rushing to support mum and everyone was rushing to support the infant. They are still in the colony, they are very happy, both thriving.

49:42 I: And you can identify these also because they have got the names on their chest. Can you tell us a bit about that?

49:48 N: The tattoos, there is a legal requirement for a permanent identification. The flip side of that is that each these animals is unique and has a unique ID and that should be a name. Jim is Jim, we've got Graceline, Bunny and Betty. If you were training these animals then the first contact is to have a name that you can tag them with and to start with. The same way we would greet somebody, we wouldn't greet somebody with a barcode, we would great them with a name. It seems most appropriate to start that with a name that you can take forward and carry on and pass on if they are going to become scientific models. It increases the contact between staff and personnel working with them. It brings them together to have a more level basis to start working with.

50:53 I: The name on the chest, how is it permanent?

50:57 N: It's tattoo. We will tattoo all the animals here, there are required to have one once they are weaned from mum. We will sedate the animals they will be anesthetised, asleep. Then we do the tattoo ourselves, we send people away on human tattoo courses. We apply the same methodologies and use the same instruments as in a human tattoo and except these guys would be asleep in contrast to us if we have one done.

51:44 R: At the moment you are hand feeding them. How do they normally feed them, how do they normally get their food?

51:51 N: The food that we supply we have actually put a great deal of thought into it. We have a captive constraint by area. So what we will do is, we will feed to the floor. Sub that we use is very dense, they will forage through this, there are food particles on this floor all the way down to mustard seeds and lentils as well as a compound diet that we buy for them. We feed a particular diet really to help the time budget during the day. We have 24 hours and these guys in the wild would feed predominately for the majority of the day. They would have to go out and they would have to find a cache of food as a group. In captivity they have a cache of food delivered every single day if not multiple times a day.

52:51 We need to engineer it so that we have reflective time budget taken for feeding as perhaps we would in the wild. This is one way of doing it, so we give them great big curly shaving, we have got irradiated straw and we use tiny, tiny particulate food, so they have to extract it. These are great extractors, they use their hands, they have got 2 feet, essentially 4 arms really. They will go through this and they are each turning over and extracting tiny, tiny particles of food. So we increase their time budget throughout the day, in contrast to how we would eat, with perhaps one dinner plate. It would take us a bit longer but it would take them seconds. Feeding throughout the day is kind of a really huge thing for them. We also have a legal requirement for *ad libitum* feeding, so at no point in the day is this saw dust devoid of food or food items.

54:14 I: You are in here by yourself, what would have happened if I had come into the enclosure with you?

54:20 N: These animals are habituated because of the interactions we perform with them on a daily basis. So they are familiar with us, we have that relationship and that bond of trust which you wouldn't have with them as a stranger coming in to them. That would have produced some anxiety for them and they would not have reacted in this manner if you would have come in.

54:52: I: Would I have been in any danger if I had come in?

54:54 N: You could have been, it's quite possible. There is nothing stopping any of these animals. These are not domesticated animals like your pets for example which you interact with on a daily basis as well. This is a relationship that is built up over many moons. There is nothing to stop them, indeed with me as well, other than this relationship that we have formed, biting or grabbing me. The same would have applied to you if you had come in except you would not have had the relationship that I have here with these guys.

56:39 N: I would prefer not to upset this group for the sake of a film by allowing you to come in because actually you could impact them and their sociality and increase their anxiety. So I would prefer not to have individuals in just for the sake of this.