



Fred Stormshak Oral History Interview, December 22, 2015

Title

“Unravelling the Secrets of Animal Reproduction”

Date

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Location

Withycombe Hall, Oregon State University.

Summary

In the interview, Stormshak discusses his upbringing on his family's dairy farm near Enumclaw, Washington. He likewise reflects on his experience of school growing up, and the circumstances by which he chose to enroll at Washington State College. He then recalls the laboratory experience that led to his switching majors from Agricultural Education to Dairy Science, and the research project on progesterone in the corpus luteum of cows that eventually formed the nucleus of his master's work at WSC.

From there, Stormshak reflects on his move to the University of Wisconsin at Madison, where he spent five years in pursuit of his doctorate in Endocrinology. In this, Stormshak speaks of the transition to studying at a much larger university, and details the struggles that preceded his eventual success in developing a method to measure progesterone in samples of blood.

The remainder of the session focuses on Stormshak's work at and memories of Oregon State University. He begins by describing the process by which he returned to the Pacific Northwest, sharing his impressions of the Animal Sciences department at the time, and recalling specific individuals who were important to him in those early years, Jim Oldfield in particular. He then traces the broad themes of his scholarly work while at OSU, detailing his research on animal reproduction, and also noting side projects on mink peltage - including the 1987 vandalization of the OSU Mink Farm - the impact on sheep of high voltage power lines and cotton seed ingestion, and the outcomes of his formal affiliations with OSU's School of Veterinary Medicine and Department of Biochemistry & Biophysics.

Of particular note are Stormshak's comments on his work studying male-oriented rams. After detailing the background behind this program, Stormshak lends his thoughts on the media confusion and controversy that emerged from the research, and speaks of the personal toll that it took on him.

The interview concludes with Stormshak's thoughts on change in the Animal Sciences department, as well as his opinions on the positioning of Oregon State University as it looks toward its sesquicentennial.

Interviewee

Fred Stormshak

Interviewer

Chris Petersen

Website

<http://scarc.library.oregonstate.edu/oh150/stormshak/>

Transcript

Chris Petersen: Alright, today is December 22nd, 2015, and we are with Dr. Fred Stormshak, who is a Distinguished Emeritus Professor of Animal Sciences here at OSU. And we'll talk a lot about his career in Animal Sciences and his association with OSU. We're in Withycombe Hall in his office.

I would like to begin at the beginning, if I could, and ask you where were you born?

Fred Stormshak: I was born in Enumclaw, Washington.

CP: Is that where you grew up?

FS: That's where I grew up. I grew up on a dairy farm there and worked primarily with Guernsey cattle, actually.

CP: What was your family background?

FS: My mother and father were farmers. They made their living, actually, from milking cows and so forth, and shipping milk and shipping cream.

CP: What was it like for you, growing up on the farm?

FS: Oh, it was great. That's where I developed my interest in agriculture and domestic animals, especially cattle and sheep. As a kid, I had goats and sheep that my father purchased for me, I guess more as pets than anything else. And we had pigs as well. So I was exposed, primarily, to most of the domestic animals on that farm, and it was a great experience. It was a great place to grow up and live there in that valley there, about fifty miles southeast of Seattle.

CP: I've spoken to many people who grew up on farms for this project, and they always talk about how they had a lot of chores to do.

FS: Yeah. We all had things that we were responsible for, and farm life is good from that standpoint because – at least for raising kids – because it develops in them a sense of responsibility. It was a good experience; I'm glad I had the opportunity to grow up on a farm.

CP: Did you have horses?

FS: Well, my dad did, but I didn't. I wanted a horse, of course, but he didn't want me to have one. And the horses that we had were mostly work horses. I was pretty small while I was growing up there on that farm, so he didn't want me to get up on any horses. But we did have horses there, yeah.

CP: What do you remember about community life, either in the area around the farm or in Enumclaw?

FS: Enumclaw was a town of about 2,000 people. The majority of the people that lived in that town, in the town itself, worked for Weyerhaeuser Timber. There was a Weyerhaeuser timber mill on the highway, I think it's 410, that goes all the way up to Mount Rainier. Anyway, it was about three or four miles outside of Enumclaw, heading up towards the mountain. So most of the people that lived there, that lived in Enumclaw itself, were employed by Weyerhaeuser.

But the outlying community was primarily made up of Europeans who had immigrated over to the United States and were farmers. Our neighbors, for example, were from Denmark and Germany and Norway and Sweden, and they were all farmers. And the farms were not huge farms like they are today, but they were farms that, at that time, people could make a living off of. And there was a lot of camaraderie there; one farmer helping another farmer to cut hay and put it up and do some of the chores that required more than one family to accomplish. So it was a good community to live in.

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CP: What sorts of interests did you have as a boy, besides working on the farm?

FS: Well I, of course, was not able to participate in sports like some kids were able to do at that time, because I had responsibilities that I had to take care of at night, immediately after school. So I didn't have much to do with sports until later in high school, when I played for our Future Farmers basketball team. But I did a lot of fishing, did some hunting. That was primarily the extracurricular activities I was engaged in, because we were near a stream where we could fish and we spent a lot of time around that stream. We had a neighbor who had four boys about my age and so, collectively, with those four boys and myself from the adjacent farm, we did all kinds of things down around that stream.

Dammed it up and made a swimming hole [laughs], made a raft out of cedar fence posts and floated down that creek for quite a ways. Which was kind of, actually, a dumb thing to do because none of us were really good swimmers. And that wasn't just some little tiny creek that you could step over. In the summer time and in the winter, it was a raging torrent, and there were some holes in that creek that were way over our head, and I often wonder what would have happened if we would have capsized on that raft, whether or not one or more of us might have been killed there. But it was a great experience; we spent a lot of time around that creek, while we had the time.

CP: You mentioned the Future Farmers basketball team, I'm interested in the kinds of connections that you had with Extension – or what we associate now with Extension – when you were growing up.

FS: Well, I got very interested in Future Farmers of America, and participated in it. Became the chapter president, eventually, as a senior, and attended the Future Farmers of America Washington state FFA conference in Pullman, Washington, which was my first exposure to WSU – it was Washington State College at that time. And then I was also elected a state officer, so I got to, for the first time, get on a train and travel back to Kansas City, Missouri for the national FFA convention, which was, for me, quite an experience. So I enjoyed the Future Farmers of America. It was a great organization for me, and because I had a project, I fit right in with that, into that organization.

And the other thing that was important about it was I had an Ag teacher who was very encouraging and encouraged me, at the very beginning, to think about going to college. Because my mother and father were immigrants, of course, and were not familiar with colleges or higher education, so I think that Ag teacher played a large part in my life from the standpoint of encouraging me to think about going to college. He was very supportive of me, for some reason. Maybe he saw something in me that I didn't, I don't know, but anyway, he was very supportive of wanting me to go on to college and get an education. Because nobody else in my family – my two brothers and two sisters that I have did not go on beyond high school.

CP: Did they continue in a farming lifestyle?

FS: No they didn't, because – well, I shouldn't say that, because one of my sisters married an orchardist over in Ellensburg, Washington, so she was involved in growing apples, she and her husband. My other sister moved down to Texas and they're on a farm down there, but that's not what he made his living at. He was an oil field worker, they just happened to live on a small farm there, which allowed him to produce vegetables and keep a few animals.

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And my oldest brother wanted to take over the farm, but he wasn't willing to give my mother what she wanted for the place. He was a carpenter and he got a job in Tacoma, Washington and worked for the Veterans Administration there. And my other brother worked for the power company in Battle Creek, Michigan. So nobody stayed on the farm, unfortunately. It was really a nice farm too; it's unfortunate.

CP: What was high school like for you?

FS: Work. [laughs] It was a good experience. I liked it because I had, at that time, I took Ag and was exposed to the Future Farmers of America. I took shop, so I learned how to use my hands from the standpoint of doing carpentry-type work. And they don't, of course, teach that anymore in most high schools. But that was a great experience. I had good teachers there. I wouldn't say I was an outstanding student, but I got a good education there in the town of Enumclaw. I took – whatever college prep classes were offered at the time, I took those, primarily because my Ag teacher encouraged me to do that.

CP: So by the end of high school, you had decided that you wanted to go to college and you selected Washington State?

FS: Yes. I also had encouragement from my sister's husband, who was the orchardist. He was very supportive as well. And so yes, I decided. And after I had my meeting there, where I met there on the campus as a Future Farmers of America delegate from Enumclaw, I wanted to go there and I wanted to major in Ag. I started out with a major in Ag Education; that was my intent. But during my sophomore year, I became employed by a professor in the Department of Dairy Science there, by the name of Ralph E. Erb. And he had me doing things like collecting milk samples once a month from the dairy herd there and then running the Babcock Test on those milk samples. The Babcock Test was a test of how much fat is produced by that particular individual in a given quantity of milk. And then he also had me start working in this lab of his; he had a laboratory in which he had graduate students working, and I was a glassware washer. [laughs]

And that's where I actually met Dr. Jack Gorski, who played a very important part in my life, because he was working on his Ph.D. at that time and he let me do some things besides wash glassware. Like, we had these samples that we had collected from animals, and at that time he was running paper chromatograms, and he says, "here, why don't you take this sample and put it on this paper chromatogram and develop it, and let's see what happens?" And gee, I thought that was really fascinating to be able to do that. And I did it and then I was hooked. And I took over his project – he left then, I think I was in my senior year, and he left before the beginning of my senior year, and I took over his project, and actually used the methodology that he taught me. And I did the research project, which I subsequently used to fulfill the partial requirements for a master's degree.

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So I finished my bachelor's degree in Dairy Science at Washington State University and then spent one more year and obtained my master's degree in 1960. And that's when the college changed its name too, from Washington State College to Washington State University. It was a very good experience.

CP: Were you able to fund yourself with this job that you had in the laboratory? How did you put yourself through school?

FS: Quite a bit. But I did get help from my brother-in-law, who was married to my sister that ran the orchard. He helped me out financially, but for the most part, I was able to make enough money to pay my board bill at the Alpha Gamma Rho fraternity, where I lived. Living expenses weren't quite as high then as they are now [laughs]. And then I had scholarships. I did very well in my classes – or well enough, I should say, that I was awarded scholarships that helped a lot. They basically paid my tuition every semester there and, boy, that helped a lot.

CP: What was it like for you to go back to the family dairy farm as you were progressing through your higher education and learning more about dairy from the academic side?

FS: Well, my mother, because my brother didn't want to buy the farm, she moved off of it. She was up in years and she couldn't handle it anymore, because my father had passed away when I was eight years old. So she could not do the work herself, so she sold the farm. So I didn't have an opportunity to go back there and apply anything that I was learning to the farm, unfortunately. But that didn't diminish my interest in livestock and agriculture.

CP: What was the curriculum like as an undergraduate and how was it different from what an Ag major might encounter now?

FS: It was more production oriented, much more production oriented, because the students at that time that were in – at least in Agriculture – were coming off of farms with the intent of going back to them. I'm not saying there weren't some upper division classes that started giving you more exposure to the science, I'm not saying that didn't happen, but most of the classes that were taught there at WSU were production oriented type classes, as I remember. And we were required to take the basic core courses in chemistry and biology and so forth, but the agriculture classes, at least in Animal Science, were oriented towards breeding and management, for example. And there were some classes that were like dealing with physiology of domestic animals and so forth. But a lot of production classes.

In Dairy Science, of course, you had to take dairy production, which was a class that talked about dairy cows and management of dairy cows. The Poultry department there, which was a very good department at that time, was oriented

towards chicken production and management – chicken and turkeys. I think that was true of Animal Sciences as well. At that time, Dairy Science and Animal Science were not combined.

CP: So it sounds like you went to Washington State with an interest in getting a higher education, perhaps to go back into agriculture at some point.

FS: Well, I wanted to be an Ag teacher to start out with, but then, after I got the exposure to science in working with this graduate student of Dr. Erb's, I wanted to become a scientist.

CP: It was that cut and dry, then.

FS: Yeah. I changed my major after my sophomore year, from Ag Education to Dairy Science.

CP: What was it that appealed to you so much, do you think, about the science side of it?

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FS: I don't know, the lab work just fascinated me. To be able to take a test tube with basically some gunk in the bottom of it, and put it on a piece of paper, and then, using ultraviolet light, look to see whether or not this particular steroid or hormone was in an extract of that particular tissue, and being able to measure it, I just thought that was fascinating. I got the exposure as to what this all really meant. It wasn't in depth, of course, but it was enough to make me want to know more.

And like I said, I took over Jack Gorski's project, that he was working on, after he left, and continued that. Which basically was a project to look at the levels of progesterone in the corpus luteum of the cow during the estrous cycle. And at that time, which was 1959, there wasn't very much information out there. In fact, the only way you could measure it was by use of chromatography and spectrophotometry, in terms of measuring the quantities using a particular wavelength in the spectrometer. And radioimmunoassays, and the really technical stuff that came along about ten years later, wasn't available. So the difference between that and what I was doing was I had to have microgram quantities before I could make a measurement. Ten years later, with the advent of the radioimmunoassay, using antibodies to bind to the particular hormone that you were interested in, you could measure it down in the picogram levels. That's quite a difference in sensitivity.

CP: So it sounds like it was a pretty easy transition for you from undergraduate to graduate.

FS: Yeah, it was. [laughs] Like I said, I completed my research project for my master's while I was still a senior at WSC or WSU, whichever way you want. So all I had to then, in the subsequent year after I got my bachelor's degree, was just take a few more classes, upper division graduate-level classes, and I had my master's degree by the end of the summer of 1960.

CP: So you went from there to Wisconsin.

FS: I did.

CP: What was the thought process in choosing Wisconsin at Madison?

FS: Well, I actually wanted to go to the University of Illinois and work with this professor there by the name of Nolan VanDemark. Because Dr. Ralph Erb, who was my mentor and advisor, went to school there and he was pushing me in that direction. Nolan VanDemark was a reproductive physiologist. But in the office next to the laboratory where I worked, in Troy Hall at WSU, Dr. Tim Blosser was a nutritionist there who went to Wisconsin. And he said to me, "you should really apply to go and work with Dr. L.E. Casida at the University of Wisconsin," he said, "because, right now, he is the primary reproductive biologist in the country, from the standpoint of working with domestic animals."

So I wrote a letter of application to both of them. I really wanted to go to Illinois, and I sent the letter, I think it was in January of 1960, because I was intending to start my program for a Ph.D. in the fall of 1960. And I sent the letters out and, within a short period of time, I got this letter from Dr. Casida, and he offered me an assistantship in the Department of

Genetics at the University of Wisconsin. And I thought to myself, "well, genetics, I'm not sure I want to work in genetics." But I came to find out that he was just housed there, his main work was in reproductive biology of domestic animals across the line. Cattle, sheep, pigs, and so forth. But I got the letter and I sat on it for a while, because I was waiting for Dr. VanDemark to send me a letter, either rejecting me or accepting me for a graduate assistantship. And I waited and I waited and I waited until February, and it wasn't coming, and so I thought, "well, that's that."

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So I wrote to Dr. Casida and accepted the offer there. And I did it, in part, also because Jack Gorski, when he left WSU, went to University of Wisconsin to do post-doctoral work there under a professor by the name of Gerry Mueller, who was working on cancer at the McArdle Institute on the University of Wisconsin campus. So I knew that Jack was there, and that kind of was one reason why I applied there. But because VanDemark never answered my letter, I thought, "well, I better accept this," and I did. And then, two days after I accepted it, I got the letter from VanDemark offering me the assistantship, but it was too late.

And maybe it was fortuitous. I think it probably was fortuitous, because I feel that I got a better training and better education at the University of Wisconsin than I would have with VanDemark. And Dr. Blosser was correct: Dr. L.E. Casida, at that time, was the premiere reproductive biologist working with domestic animals. He was tough though.

CP: So you had identified reproductive biology early on as something that you wanted to focus on, and indeed you did, how did you arrive at that as a subject of primary interest for you?

FS: Well, because of the work that I was doing as an undergraduate. Because basically the project that Jack Gorski worked on there was reproductive biology, it was just part of it. And I wanted to continue working in that area and that's part of reproductive biology.

CP: What was the adjustment like for you, moving to Wisconsin?

FS: Oh gosh. The WSU campus at that time could have fit into the University of Wisconsin campus about seven times. It was that huge. It was kind of – I don't know if I should say it was a cultural shock for me – but it just went... When I first got there and I was supposed to walk down to the Department of Genetics, it just went on and on and on and on, and I thought I would never get there. It was strung out along Lake Mendota for, I don't know, it seemed to me like it was a mile or two miles; it was huge compared to WSU. But the thing that I sensed there, more than I did at WSU, was an aura of research. And I can't define that for you because you can only – I can't really define how that feeling is, but I sensed that in the atmosphere there. That this was an institution that focused, clear across the board, on research. And I never got that feeling at WSU. There was a lot of collaborative effort there on that campus at that time, and people working together across departments and so forth. I didn't see that at WSU. But it was huge, I remember that.

CP: Tell me about your academic progression while you were there, and the progression of your research.

FS: Well, [laughs] Dr. Casida brought me there because I had experience with measuring progesterone in biological tissues. And the person whose shoes I was filling was graduating with his Ph.D. and he was leaving, so he needed somebody to continue that line of work. He wanted somebody there that actually could develop a method for measuring progesterone in blood. But, you know, I had never done that. I can measure progesterone, but I had no experience whatsoever in measuring this particular hormone, progesterone, in blood or serum or plasma, as far as that goes.

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So he wanted me to develop the method to do that, which I did; I began working on that. And concomitantly, he had me doing this project with rabbits, [laughs] which, I mean, I had rabbits as a kid. And I was kind of let down by that, because I wanted to work on, you know, dairy cows or beef cattle or something a little bit bigger than a rabbit. But as it turns out, that was a really good project for me, because what he wanted to do – and I think he sensed this when I came there, I didn't have a very strong background on biology. And I thought I did, you know? [laughs] But his method of mentoring students was to get them to think. Around him, you had to be thinking all the time, because you never knew what he was going to ask you. He wanted you to be able to understand what you were doing in terms of what it meant to the animal. And I had never got that kind of training at WSU.

But anyway, so I was working on this method of trying to develop a procedure for being able to extract progesterone out of plasma or serum, and quantify it by the same technique that I used for the tissue – that is, paper chromatography followed by using a spectrometer. And I had a difficult time with that, because there wasn't anything out in the literature to really indicate how other people were doing it. I mean, there was some work in England by people that were trying to do this, but otherwise, there was nobody in the United States, at that particular time, that was trying to quantify this particular hormone in plasma or serum. And it was a frustrating experience for me because you cannot take plasma or serum and simply add an organic solvent to it, to extract the hormone, because what happens is it just curdles the serum or the plasma and forms a type of – it looked like cottage cheese, except it wasn't white in color, but the plasma would just... And, as a consequence of that, the steroid becomes trapped in those globules of serum or plasma and the organic solvent can't pull it out.

And so my recovery – what I began doing was taking serum or plasma in a given quantity and adding a certain amount of this organic solvent, I mean, I tried them all. And every one of them would basically do the same thing, and that was make cottage cheese of them. The extraction efficiency was down around twenty-five percent; that's not good enough. It had to be up around at least eighty or ninety percent, in order for it to be effective. I was beating my head against this, and he was getting frustrated with me, and it actually came to a point in my first semester there where – the laboratory where I worked in was in the Genetics building that housed the mice and the rats and that staff, which was a little further away from the main part of the campus. But that's where he had his laboratory. [laughs] And he would come down every morning and ask me, "how's it going? How's it going?" And I'd have to tell him, "you know, I tried this and I'm not getting any better than twenty-five percent." He says, "oh," he'd shake his head, and say, "maybe we should go up to the medical school and try gas chromatography." And I thought to myself, "you know, this is my project, I'm going to beat this thing, I can beat this thing, I can figure out a way to do this."

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It got to the point though where I could look out the window in the morning – and I got tired of giving him negative results – so I could look out the window, I could see him drive down, park his car, and I had it figured out, there was a door like this out the other end of the lab, and when I could no longer see him – the front door was a couple rooms down – when I could no longer see him, I would go out that door. And then he would come in and I wouldn't be there. [laughs] Because I didn't want to tell him negative results. Because I was working – he didn't know this...well, I'm sure he did, maybe – but I spent a lot of time trying to figure out how to add this standard progesterone to this serum and recover more than twenty-five percent. And I didn't want to have to go up to the medical school and admit defeat.

And then, so one day I read this article, and this guy over in England had added sodium hydroxide, a base, to whole blood, and he showed that he could recover the progesterone in a pretty high percentage. It was more than twenty-five percent. And I thought, "Oh, my God!" So I did that, I took some sodium hydroxide, took a sample of plasma that I had, added some sodium hydroxide to it, added the organic solvent, it never curdled up. And my extraction efficiency then went to eighty-five percent. Boy, I'll tell you, that was a stroke of luck. That's a good example of why reading the literature, sometimes, is very beneficial to a scientist. It was quite a find. And then, after that, we used the procedure for looking at progesterone levels in the plasma of sheep and so forth.

But yeah, I thought for a minute there that he was going to kick me out, [laughs] because I was such a failure.

CP: Do I understand correctly that you had your first experience in teaching at Wisconsin as well?

FS: I was made an instructor there, and yes, I did have a little bit of teaching experience there in the undergraduate class that Dr. Casida taught. But it was pretty minor. I didn't really get into being able to teach, to a great extent, until I came here.

CP: Well, there was a job in between Wisconsin and OSU, correct? You were in Maryland at the USDA.

FS: At the USDA Dairy Cattle Research branch there, on the Beltsville campus, where the USDA has its big experiment station. I spent some time there; we did some good stuff there. And it was kind of collaborative projects with people in the swine area, but predominantly with sheep. It was a good experience. But, I don't know, I always wanted to come back

to the West if I could, and this job opened up here at Oregon State, and I applied for it and was very fortunate to get it, I think, because I think I've had a really good career here at WS – I'm sorry – at OSU. I'm still back at WSU.

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CP: So that was the primary motivation then, was to get back a part of the country you were more comfortable in?

FS: Yeah, I wanted to get back to the Northwest. That's where my roots were, you know, and I missed the mountains. People, for example, in Maryland, think they have mountains there, but they're really not by comparison, they're kind of like foothills. And at that time, when I was there, the environment there was not conducive for raising a family. It was a time of turbulence. If you remember the late '60s, '66, '67, '68, there was rioting there because of the assassination of Martin Luther King and all the things that were happening to the African American population in this country. And my wife and I just felt that there would be a better place to raise our children in a different type of environment than that, and so I began applying for positions out this way.

CP: Had you been to OSU before you got the job? Did you have any experience of it?

FS: [shakes head, no]

CP: What were your initial impressions of the university and of Corvallis?

FS: I liked it. I felt like it was kind of like the town I was born and raised near, like Enumclaw. I liked the fact that it was not in a big city. I thought it would be a great place for us to have our kids and to have them grow up here, and the people were very friendly. The staff here was very friendly. Dr. Oldfield was the head of the department, he was the one who hired me, and I was very impressed with him. I thought it would be a great opportunity, and it has been. Or it was, I should say, I'm retired now, but I had a great career here.

CP: What was the state of the Animal Sciences department when you arrived?

FS: It was a good department, it had a good reputation, and it was a very productive department as compared to the situation now. I think the staff that was on hand at that time, if you go back and look through the literature, you'll see a lot of papers that were published by the faculty of this department in various areas of research – in genetics and nutrition. We had some great nutritionists here, Dr. Oldfield was a non-ruminant nutritionist. And David Church, who was ruminant nutritionist. Al Ralston. They were good nutritionists. And then we had pretty good geneticists in Dr. David England and Ralph Bogart. I mean, they were highly productive people – at least Bogart was, he was very productive. And we had other people on the staff here that were good production-oriented people, in both dairy cattle and beef cattle, and swine, and it was a good department. It had a really good, strong reputation. I thought it was a very good place to work.

CP: Can you tell me more about Oldfield?

FS: Well, you know, he's well-recognized for his work in selenium. He played a major part in diagnosing white muscle disease in lambs and so forth as being caused by a selenium deficiency. He was a great administrator. He was a very compassionate person, very understanding person. He was very supportive. And he had a national reputation, of course, because of his work. He was a true gentleman and scholar, absolutely. I don't think I've ever met anybody that – well, except for maybe Dr. Casida – but Oldfield is the epitome of being a true scholar and gentleman in all respects. He had your best interests at heart, and he tried to help you as much as possible, and he had a great sense of humor if you got to know him. I still see him once in a while; of course, he's still living.

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We had some good times together because, when we would go to the national meetings, we'd frequently room together. He'd give me a hard time about, he'd go to bed with the birds and I'd come in late, and he'd give me a hard time about that, of course in a kidding way. [laughs] I have to laugh because, when I would come in, I would ask him for things for the laboratory. I'd say, "Dr. Oldfield, is there any possibility that I could get a new tabletop centrifuge for the lab?" And he'd say, "oh sure, no problem." The next morning I'd say, "when can I order that centrifuge?" And he'd say, "what centrifuge?" [laughs] So I knew that, when he was talking to me, he was half asleep. [laughs]

CP: Who were some other OSU people that became important to you in those early years?

FS: Well, Fred Hisaw, who was in Zoology, who taught endocrinology, because obviously I would relate to his work. And his father was a great endocrinologist as well. And Frank Moore in later years, towards the middle part of my career, Frank Moore became the endocrinologist over there and we'd have journal club meetings together, my students and his. Frank was a very good scientist, a really good scientist. Carl Schreck in Fisheries and Wildlife was also kind of a reproductive biologist for fish and measure a lot of different types of hormones in fish as a consequence of fish stress. And then, I don't know, at this point I think they were the primary individuals.

I had some interrelationships with the Vet School down there. There wasn't a Vet School, you know, early on. There were just some veterinarians down there that taught some classes. But the vet work on our animals... But Jesse Bone was a pretty good physiologist; he and I cooperated on some studies. But for the most part, I had a good working relationship with the endocrinologists that were in Zoology. Fred Hisaw to begin with and subsequently Frank Moore. I think those were the main people, outside this department, of course.

And then here in this department, of course, we had some cooperative projects with Fred Menino, who teaches the undergraduate class in reproductive biology.

CP: So was your position, when you arrived, was it a standard teaching/research position?

[0:49:52]

FS: It was seventy-five research, twenty-five teaching, basically on paper. That's not the way it turned out, of course, [laughs] but pretty close. I did not teach any undergraduate classes except Applied Reproductive Physiology, which was a 300-level class that I team taught with Dr. Menino. Well, Dr. Wu was the other reproductive physiologist in the department when I came, and then he retired and Fred Menino took over that class. So we team taught that class. But I was responsible, primarily, for teaching the reproductive biology of domestic animals class for the graduate students, the 600-level class. I think it was 600. And then I also was able to get an affiliate appointment, thanks to Dr. Chris Mathews, in Biochemistry. And I have an affiliate appointment in Biochemistry and I taught a class on hormone action, which was cross-listed between this department and Biochemistry, for a number of years. I think I started teaching that class in about 1980, or shortly thereafter.

One of my first students was Dave Williams.

CP: Oh, at the LPI now.

FS: Yeah, I think he's part of LPI, but also he's in Toxicology.

And some of the other students that I had in that class, that are doing very well now, are Kent Thornburg at the OHSU medical school, has done very well in his career. And then my own graduate students who I mentored, most of them obtained positions in other universities and have done very well. Kind of bragging there, but not telling you something that isn't true. [laughs] And that's the way it should be. They should be doing, actually, a lot better than I was able to do.

CP: Well, I have some specific projects that you were involved in from the research side that I want to talk about a little bit, but I'm interested in getting a sense of the early years of your research here at OSU, because that's a little less clear to me. It sounds like it was mostly reproduction; were there specific things that you were involved in that were of particular note?

FS: Yes, well, some of the first projects that we were involved in were looking at the impact of estradiol, for example, estrogen, on the function of the ovine corpus luteum. And basically, my work here has focused primarily on the ovary and the uterus of the domestic animal. It's either been the sheep, it's been the pig, or it's been the cattle – beef cattle, not so much in the dairy. Surprisingly, I didn't do much work with dairy cattle. Mostly beef cattle, sheep and pigs. And the focus of my program was primarily to understand what was driving the corpus luteum. The corpus luteum is an endocrine gland – an ephemeral, short-lived endocrine gland – that develops from the follicle on the ovary that liberates the egg. And if the animal does not become pregnant, it has a very short life span, it regresses, and the whole cycle starts over again. So our

research that my students conducted – primarily my students conducted this research – was to look at various factors that affected the life span of this corpus luteum in cattle and sheep.

And that was primarily the focus of my research all the way through my career. It deviated, every once in a while, from that. We had a great cooperative project when I had a student here that worked on embryo survival in pigs. I think there were two or three students that mentored that work in that area. It didn't have anything to do with the ovary, but it certainly had something to do with the uterus. And we had a great project going with Dr. Ralph Mauer at the U.S. Meat Animal Research Center at Clay Center, Nebraska. And using reciprocal transfers of embryos, we were able to show that embryos from first estrus gilts that were transplanted weren't as fertile as those that came from pigs that were allowed to cycle at least three times. And that's important because most swine producers do allow their sows or gilts to cycle a couple of times before they put them into production. Anyway, that was a good project as well.

[0:55:35]

I didn't look too much about nutritional factors affected reproduction. I looked mostly at the biochemical aspects of the function of that endocrine gland; the factors that would impact signal transduction and cause the gland to either produce progesterone in greater or lesser quantities and/or tried to find the internal factors that were produced by the uterus that influenced the function of that gland.

That was the early work, I think. And then in the later years, we looked at this particular protein, using the bovine corpus luteum, that actually played a role in causing the exocytosis of granules out of the corpus luteum. Because the corpus luteum, in the 1990s, was actually found to produce, besides progesterone, was able to produce oxytocin and relaxin in some species. And these are the peptide hormones, they're not steroids. And so, how these peptides were excreted or secreted from the cell became of interest to me, and I wanted to know how they were packaged and liberated from the cell. And this particular protein, called the MARCKS protein, played a role in that. And what called the MARCKS protein to – it was part of the actin cortex of the cell, so it allowed the cortex to open up to allow secretory granules to be extruded from the cell. And so we spent some time looking at that, and it was a fascinating project, but it was probably more molecular than what my earlier work was. And that was primarily what my career here was focused on, was uterine function and ovarian function.

And even now today, although I'm retired, I'm still involved with research on sheep with my collaborator, Dr. Charles Roselli from the OHSU medical school. You may know about the work that we started here about fifteen years ago, looking at the biological basis for homosexuality in rams – male-oriented behavior in rams – so we're still involved in that project. And I also have an interest in trying to look at the function of the membrane estrogen receptor in the uterus. At one time, it was thought that steroid receptors were only functional in the nucleus, they would bind to the DNA and they would cause genes to either be expressed or repressed. But in recent years, it has been shown that, in a number of species, the estrogen receptor also resides in the plasma membrane. So we've tried to see whether we could quantify the amount of estrogen receptor in the endometrium of the ewe that has been exposed to estrogen and progesterone. And that's kind of worked out; I'm doing it on the side besides this work with Dr. Roselli and the sheep.

[1:00:15]

CP: What sort of infrastructure existed, or has continued to exist, at OSU, that was supporting your research? And how did it compare to the other institutions that you'd been – Washington State and Wisconsin?

FS: It's not comparable. I mean, it was good here, because I had the opportunity to go up to Biochemistry, for example, and sit down with the biochemists up there and tell them, "how can I do this? How can I do that?" And they were very helpful to me, from that standpoint. Dr. Gary Merrill was one of them, Henry Schaup, when he was here, was a big help to us in terms of quantifying RNA. And then, like I mentioned to you previously, I would spend time talking to Frank Moore about my research and getting his ideas in terms of how to approach it or what I could do differently to solve this particular problem that we had. So I relied quite heavily on the people in Zoology and Biochemistry for support in terms of knowledge; supportive knowledge, that I might not have... If I got stuck on a problem and I didn't think I had the background to be able to answer it, I could go to them and they were a big help.

It was better here than it was at WSU, but not as good as it was at Wisconsin. But you've got to remember that the staffs at various departments at Wisconsin are probably three times larger than they are here. And so there's more people with different types of background that you could go to, to get information, to answer a particular question.

CP: You did some work with mink, is that correct?

FS: That's right, yeah.

CP: Do you have memories of the mink farm being vandalized?

FS: Oh yes.

CP: Can you tell me about that period?

FS: Well, we had some very good projects going there with mink. We had over a thousand mink on the farm and they were being used for different projects. The nutritionists had – Floyd Stout, who was on the staff here, did some work on nutrition in mink, and Dr. Oldfield actually, being a non-ruminant nutritionist, did some work with them. And I got involved in that because of Dr. Oldfield, and we started looking at the role of melatonin. Now I think we did that because we'd read some place that melatonin could affect fur growth. So we started looking at the impact of melatonin on the development of the prime mink pelt.

Mink producers, at that time, were pelting their mink, to take the mink pelts, around sometime in December. Prime winter pelts were taken from mink in this time of the year. And basically, through the work of one of my graduate students – or a couple of my graduate students, actually – we found that if you put in a melatonin plant in June, it would cause them to shed their summer fur and grow their winter fur, the prime winter peltage, a month or so earlier. You could get prime winter peltage in October if those mink had been implanted with melatonin. I'm assuming – and I've lost track of it because we don't have a mink farm here anymore, obviously, and I've lost contact with the mink producers in the state – but I'm assuming that the mink producers in the Midwest, for example, are using this technique now, because it saves them about sixty days' worth of money in terms of feeding those animals. And you can't find any difference between the winter peltage in October that was induced by implanting mink, than those that are allowed, normally, to reach their winter peltage in December. The pelt is just as good.

[1:05:25]

So that was an interesting project and it was really quite exciting, actually, that you could actually do something that was of benefit to somebody right off the bat. So that was nice.

CP: And the vandalism incident?

FS: Well, it happened, I think on the Sunday after graduation here in, I think it was 1987. And they broke into the mink farm at night and vandalized it, burned down our barn, set our barn on fire, and turned all our mink loose. And I think some of them were recovered, but a fair number, I think, were lost. And I'm sure that those mink probably died because ranch-bred mink are not bred to survive in the wild. And I don't think that the people that do this type of vandalism understand that. They're hand fed, they're not taught by their mothers to be able to go out and kill to survive. But basically, that incident, that was the end of the mink program, that totally terminated it, because we couldn't get funding. We used to get funding from the mink farmers of the state of Oregon and we used to some from the Mink Farmers Research Foundation, and after that happened there, and we lost our facility and a lot of our mink, there just wasn't much that we could build on.

And then, also, there was a downturn in the money that mink producers were getting for their pelts. So the amount of money that we could have gotten from the Mink Farmers Research Foundation was way down. We just couldn't run the program without the same type of funding that we had gotten in the past.

CP: You also did a project on high voltage transmission lines and the impacts that they were having on hormonal changes in sheep, is that correct?

FS: Yeah, that was kind of a side project. We took it on because, again, there was a thought that the high voltage lines were affecting the secretion of melatonin. So Bonneville Power provided the money for this project, it was a huge project, and we ran it for a number of years. Bonneville Power built, up by Estacada, there was a station there – they have a power station there by Estacada – and they built a huge control pen away from the power lines, I think it was more than a hundred yards away from the high voltage power line. And then there was one directly underneath the 500 kilovolt power line. And sheep were in each of those pens, same number of sheep, and samples of blood were taken from them at various stages of growth, and we monitored the melatonin levels in these animals as a consequence of being exposed to that high voltage power line. And in the controls, monitored other things such as body growth, body condition, their wool growth, whether there was an effect on their cortisol levels by the stress. And basically showed that there wasn't any effect. Because there was a lot of concern at that time about whether or not people living near these high voltage power lines, or their children, were developing cancer from that, from the exposure to the voltage.

[1:10:04]

CP: Some work also on cotton seed and the possibility that it creates gestational abnormalities in sheep. Am I correct on that?

FS: Are you talking about the cyclopropanoid fatty acids that came from cotton seed?

CP: Probably so.

FS: Yeah. We looked at – cotton seed makes this particular fatty acid, and we did use that fatty acid to look at, if I remember correctly, the impact on luteal function in sheep. And if I remember correctly, it was detrimental. But you must remember that it was experimental and the levels that were given to bring about this effect were probably levels that were not present in the animal just consuming cotton seed, unless it consumed a lot of it. I'm not saying it's not possible, but we wanted to see whether or not this cyclopropanoid fatty acid would interfere with the corpus luteum to be able to function normally, and it interfered with it, if I remember correctly.

CP: You mentioned that you had an adjunct relationship with the College of Veterinary Medicine, I'm interested in knowing more about the connection between Animal Sciences and Vet Med at OSU.

FS: Well, it's very strong now, I think. It wasn't for a number of years, of course, but I think there's a good working relationship between this department and the College of Veterinary Medicine now. In fact, Dr. Estill – Dr. Charles Estill – is a member of our team that works on this male-oriented behavior in sheep. He does all the surgeries and he participates in the development of the projects. So he's an integral part of our research team, and has been for a number of years. And actually, it's probably the best example of the working relationship between this department and Veterinary Medicine. And, of course, Dr. Estill does have an appointment in this department as kind of an Extension appointment, I think; I'm not sure. And as I mentioned to previously, Dr. Bone who – there wasn't a College of Veterinary Medicine back in the '60s or '70s, early '70s, but he and I worked on at least one or two projects, I think, where he did the surgery to remove the corpus luteum from beef cattle.

CP: I wonder if Kelvin Koong was part of bringing them together a bit more too, since he was the head of both at one point.

FS: Possibly. I don't know if that had really a big impact in our working relationship. I know it didn't have any impact in my working relationship with Dr. Estill. I think – and I'm sure you understand this – collaborations occur as a consequence of need, and Dr. Estill has certain talents that fit in to our program. So that's how that relationship developed and I think it would be true for, there are other people in this department that, I think, have cooperative projects with the people in Veterinary Medicine. I think Dr. Jean Hall in Veterinary Medicine has some kind of a working project with one of the faculty here in terms of a selenium project that she's working on. So I think it's a closer working relationship now than it has been, or like it was years and years ago.

[1:14:58]

CP: You mentioned the male-oriented rams, [laughs] and it's something that we need to talk about. I'm interested in knowing how this came about in the first place. How did the study begin?

FS: Well, the study began in 1996, actually, because I was on a National Institutes of Health grant study section, and so was Dr. John Resko who was at the Primate Center and then also he was chair of the Department of Physiology and Pharmacology at OHSU. And he was interested in factors that regulated behavior in monkeys – macaque monkeys, or rhesus monkeys, I should say. And we would travel back to these – and room together – we would travel back to the National Institutes of Health three times a year, and we would fly on the same plane. So we sat next to each other and he would tell me about what he was doing. And I happened to, at that time, in 1996, I happened to read this article in the *Journal of Animal Science* by these people that were working at the U.S. Sheep Experiment Station in Dubois, Idaho about the fact that they had come across this group of males that were basically male-oriented, they showed no interest in females.

So I told him about that and he became very interested and he said, "we should go over and talk to those people, because I would be very interested in trying to see what's making these animals tick." And he had the expertise at the time to measure aromatase activity in various tissues and so forth, so he and I actually, I think we flew to Boise and then rented a car and drove the rest of the way to Dubois. And Dubois, Idaho is stuck out in the middle of nowhere – I can remember that trip – but we did get there and we met with a scientist there by the name of Dr. John Stellflug and Dr. Jim Fitzgerald was the station superintendent at that time, and the two of them told us about the work that they had done and so forth. And they said they were going to sacrifice some of these male-oriented rams in October and they would be willing to give us some tissues – testes and brain tissue and so forth. So Dr. Resko said yes, he would like to have those, and they did send us those tissues over dry ice and we processed them – or, I should say that he processed them – and that's how the project started.

And then it kept going, and he retired, and then Dr. Roselli took it over and we've been going strong on this project for almost now fifteen years, with him writing grant proposals to NIH to fund the work, and OSU, there's a support team here that houses the animals, but we also are involved in formulating the various experiments and doing the research to try to find out what the biological basis for this behavior is. And it's our feeling, and has been our feeling all along, that this is something that happens *in utero* when the fetus is developing, and that's what we're working on.

We discovered this grouping of neurons in the anterior hypothalamus of these male sheep that are male-oriented, that are different, or differ, from those in the heterosexual male and they're different from the ones in the female. They're somewhere – in volume – they're somewhere in between the two. The grouping of the neurons are not the same as they are in the heterosexual male, but they're larger than they are in the female. And so we've used that as our focal point for all of the subsequent research that we've been conducting.

[1:20:12]

There are some amazing things that we've found as a consequence of looking at these neurons, and that is that – and we were just talking about this the other day at our meeting – the grouping of the neurons that make up the sexually dimorphic nucleus, is what it's called, are surrounded by neurons that we've found that we've identified as being producers of prolactin. Now why would the neurons that surround this particular grouping of sexually dimorphic nucleus neurons, produce prolactin? Because prolactin is not supposed to be produced anywhere except the pituitary. So that's a fascinating discovery. It means something, but at this point, we don't know what it means. But it's something that we're going to be looking into, I think, coming up here shortly. It's very unusual; I don't think anybody else has seen that.

And so our work continues. We're trying to identify the role of the various hormones that the male produces – testosterone and estrogen and so forth – in terms of the impact that it has on the development of these neurons and also on whether or not we can alter the behavior by injecting mothers with these hormones, and having them give birth to the young, and then looking at the behavior of the males that are born. And there are some differences, but they're subtle differences. I mean, we're impacting behavior, but it's not the full-strength behavior that we anticipated at this point. So it's still a strong ongoing project and we're finding out new things almost every day as we go along, about the brain. And you know, the brain is a very important target now by the National Institutes of Health, because of President Obama's brain initiative, which I'm sure you're probably familiar with.

CP: It's a line of research that's made headlines, on a few occasions, for various reasons.

FS: Unfortunately, and at the wrong times and the wrong places. Yeah, our research was targeted by PETA, and it caused the gay and lesbian community in our population to become very upset over this, because they didn't understand it. They thought we were trying to make a, they were trying to develop a therapy for it, and that's not the basis for our work. Our basis is simply to look at the biological basis for this behavior. We are making no attempts, what so ever, to try and convert a male-oriented person to a heterosexual, or even to try to convert a male-oriented ram into a heterosexual ram. That's not the focus of our research. But it was misunderstood by PETA, they didn't understand the grant proposal that they used, that they acquired from the NIH, because of the Freedom of Information Act.

And it just got completely out of control, there were articles appearing in the *Oregonian* and the underground newspapers that gay and lesbians read. And our own gay and lesbian population here on campus became upset about it, we had to go and talk to them about it and try to explain about what we were doing. It got into the *London Sunday Times*, all misinformation, because they really didn't bother to ask the people that were involved, like myself or Dr. Roselli, they would just take it out of context from what somebody else had written. And you know, when that happens, after about two or three different people have read this article and misconstrued what it said, then that's read by somebody else, and pretty soon it's completely opposite to what is going on. I mean, it just spread worldwide. Newspapers in Germany, England, Australia, all were covering this stuff. Canada. And very few of them were on target from the standpoint of what we were really doing and why we were doing it.

[1:25:36]

But surprisingly, *Time* magazine did a feature on us, and they got it right. I think it was February 2004 issue of *Time* magazine, one of the issues in February 2004. And they did a good job of explaining why we were doing it, and trying to get the point across that it was basically just looking at the biological basis for this behavior and not trying to develop a therapy that converts somebody of one orientation to another. I even got a letter from Martina Navratilova, because she's a supporter of PETA and she's also a lesbian, and I believe she contacted President Ray and told him to terminate this project here. I feel sorry for President Ray, because I think he and the president of OHSU must have gotten about 10,000 email messages from various gays and lesbians across the country and world, asking us to cease and desist. But neither one of them caved in, thanks heavens, and we rode out the storm, so to speak.

CP: It must have been a very crazy experience for you.

FS: It was. It was also a bit scary because, you know, we got threats against our lives because of what we were doing. So that was scary. But I think the point got across, finally, and we stopped coming under attack by various people, and got kind of back to normal again. Hopefully we'll stay that way.

CP: We won't talk about the football player. [laughs]

FS: Yeah, and that was kind of a goof up on our part, because the ram that he actually took was not a gay ram. But the girl who came down from the Sheep Center – because the police called the Sheep Center up here – came down, and because of the ear tag, it was one of our controls. So she said, "oh, that's one of the gay rams." And the police heard that and then it just [makes exploding noise].

CP: Well, as we wrap up a little bit, I have a couple of concluding questions for you. And one is something that we've touched on a little bit, but I'd be interested in a broader thought or perspective on change in Animal Science and in the College of Agriculture. You came here as OSU was celebrating its 100th anniversary, we're looking now at its 150th, you've had a long connection with this place and you've seen a lot of change, I'm sure.

FS: Well, I could tell you that the nature of the population of the students that are in the classes here now in Animal Science are much different than they were back in 1968. I mean, at that time, in this department, the majority of the students here were from eastern Oregon and they were ranch kids or farm kids of one type or another – wheat producers that had beef cattle on the side, a lot of ranch kids from eastern Oregon. And if you look at the population of people we have in here today, as a consequence of the fact that we have this option for pre-Veterinary Medicine students, the majority of our students are from the suburban areas and urban areas of Portland and surrounding communities, and they have no background, to speak of, in large animals. I mean, they didn't grow up on farms and ranches and they mostly want to become veterinarians to be able to doctor dogs and cats.

[1:30:17]

And ninety percent of the students in this department – and I could be wrong about that, but I'm sure it's pretty close – are women. And there's nothing wrong with that; they're good students and they're smart, or I should say, intelligent. But the number of students, men and women, that come here that have a ranch background or farm background are pretty minimal. Pretty few number of those.

And the nature of the classes, like you probably would expect, have become more scientifically oriented. There's a lot more molecular biology in a lot of the classes, because we know more, obviously, about what goes on in organs at the molecular level now than we did in 1968. And that's reflected by the type of classes that are taught, the nature of the content of the classes. So I would say that that's the big difference between the type of classes that we had in '68 and those that are being taught here now.

CP: And then the last question is just on the direction of the university as it looks toward its 150th. Where do you see OSU as being positioned right now?

FS: Well, my feeling is – of course, this is just my opinion – but I think that we're moving away from being a Land Grant institution. And the emphasis that the administration is placing on this institution has become more Engineering-oriented. I think that's kind of unfortunate because this is a Land Grant institution and agriculture is responsible for about 10.6% of the economy of the state of Oregon, or somewhere in the neighborhood of \$22 billion. And there seems to be less emphasis being put on the role of the university in terms of promoting agriculture than it was in 1968. That's just my opinion, of course, and I'm not sure that, in the long run, that's going to be a good thing for the university. I mean, the state, because agriculture plays such a large part in the economy of this state, the state needs to have an institution that is in the forefront from the standpoint of doing research on plants and animals. And I don't know if it's going to continue in that vein. I'm sure there will be departments present, but I think that the support that we have for agricultural research today is less than it was in '68, on the average. That's just my opinion, of course. I don't know whether I answered your question or not.

CP: You're not the first person who's told me that.

Well Fred, I want to thank for this, it's been a pleasure.

FS: Well, it's been my pleasure telling you my story. You don't always get a chance to do that.

[1:34:22]