



The Present and Future of the International Center for Aquatic Research by Dr. Rick Sharp (1995)

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I'd Like to Start with a list of things we want to do at ICAR. The first thing that we want to do at ICAR is to establish ways in which we can seek coach input when we set our research agenda, when we establish priorities of projects, and define the kinds of things that we want to attack with the research tools available to us. There are a number of ways we can go about seeking that kind of coach input. The main thing that I wanted to try to do the first year or so is listen and ask and offer a basically an open door policy at ICAR so that if you have ideas that you want explored I would really like to hear about it. Another way that I think that we might get more coach input and setting our research agenda is to develop some kind of survey form in which we ask very specific questions of coaches to try and get an idea of where coaches think we need to go with regards of issues like training, how much volume should be done in this particular category and stuff like that. As we collect that information I hope to be able to share that as well too.

Another thing I think is very important for us to do at ICAR is to be involved in deck based research. What I mean by deck based research is research that will generate findings or techniques or tools that coaches can apply to the on deck preparation to the swimmers. Purely academic questioning of ideas or research topics, is probably not going to service very well in helping coaches figure out ways to help swimmers swim faster. So I really want to spend a lot of time while I'm in the position at ICAR trying to lead us to design a lot more deck based or coach friendly research.

A third thing we want to do is to put a higher priority in publishing our results and peer reviewed journals. I came from a very academic environment to begin with, being a professor at Iowa State University and being trained in science in the classical way. Our attitude in that field is that until the research is published and appearing in a peer reviewed journal, it has not been done. At the same time that we want to be focusing on publishing in peer reviewed journals such as the Journalist Swimming Research, Medicine and Science and Sport and Exercise, Journal of Bio-Mechanics, and some of those others, we want to also will be able to publish in more coach oriented journals as well. This is a way for us to share the results in a less technical way and a more tactical way with coaches in order to show them how then can you put these data to use. What are some different ways or different ideas that spring up as a result to the research that we do? And hopefully we can dovetail the two publications in such a way that we don't have to wait for three years before the results appear in a peer reviewed journal before we start sharing it with the coaches. I'm going to struggle with that issue because it is going to be an issue but, we are going to do our best to get the information into the hands of coaches as soon as it's practically possible. I don't want to be so hasty that we don't go through the proper procedures before we put that information into your hands and help you start using it.

And last but not least, one of the things that I like to do when I conduct research, and this has been true also when I was at Ball State as a doctoral student doing research with swimming there and also the 12 and 13 years at Iowa State, I always like to involve coaches in the research process. There is absolutely no reason in the world for us to exclude or alienate coaches from the research process. We happen to be the people that have the training to conduct the research but coaches are the people that have the ability and have the resources to help research go in the right directions, particularly if it's practical deck-based research. So I think what you'll see is that we will have a great deal of coach involvement in collecting the data designing the studies and even in the interpreting of the results and suggesting the ways the results might be applied to coaching.

More specifically, here are some of the tasks that I had to face in the first three months. These are things that have been a real high priority for me. Number one was to get in there and evaluate the staff and how we can organize the staff of ICAR in such a way that will make accomplishing the general goals that we've set go as effectively as we can. The first thing that we had to do in that respect is we had to get rid of shared contracts. There were no exclusive USS employees of ICAR. Instead the people that we have working at ICAR up until this last summer have had a shared contract with the University of Colorado at Colorado Springs. The reason why that I didn't like that was because these people never knew really who they worked for. Am I suppose to be at ICAR today? Am I suppose to be at the University? Who evaluates me? And on and on. So we had to take care of that.

We needed to redefine job duties and doing we created the position of Biomechanics, which Jane Cappaert is in. We created the position of Director of Exercise Physiology, which we have Jaci Van Heest in. and we created a

position for a Laboratory Technician that is vacant at the moment and we plan on this fall or even maybe early in the winter start conducting a search of get the right lab technician to help us keep all the equipment up and running and maintaining certification of the laboratory. We also have with us a nutrition consultant who is Jackie Burning. Jackie is no longer a USS or ICAR employee and instead she has taken a full time position with The University of Colorado, Colorado Springs, but we retain her as our nutrition consultant to work with us on projects and service testing and things like that.

We are going to try and increase the research budget. I don't know what the research budget used to be at ICAR but I can tell you it must of been a heck of a lot more than what it is when I took the job. So the plan of attack for the next few years is to gradually increase the amount of research that we do and then commensurate with that to try and increase the research budget that we have available to us so we can conduct the things that we think are worth it.

We are in the process of right now reevaluating our service testing program and also assessing our equipment needs because there is a great deal of equipment that is sitting around at ICAR that wasn't particularly well maintained and some of it went out of date and right now we are taking care of those problems by bringing that stuff up into the 90's, so we can start using these things in our research and in our service testing program.

In the way of balancing our efforts at ICAR, in past the distribution of effort was 90 percent of the effort was devoted to service testing and only about 5 percent of their time efforts and time were being devoted to research and

education of coaches. I don't blame that on the staff that was there at the time because they were forced into that kind of a situation, but I feel we need a balanced approach to what we do with swimming and so consequently my goal is to put the research back into the International Center for Aquatic Research. To do that what we are going to have to do is reduce our service activities a little bit and at the same time also increase our efforts in coaches education as well.

Now what I would like to do is shift gears at this time and start talking about some of the projects that we are currently involved in and talk about some of the ones we have planned for the coming months or next year. One of the things that we are interested in right at the moment relates back to some of the early studies that I did in collaboration with Costill and some of those people in the early and mid-80's.

We did studies with the swim bench and some of you I know are familiar with that old research but basically what we found in those studies was that there was a very close correlation between the ability to generate muscular power and a person's sprint speed or sprint performance but only up to a certain level out of a power output of 300 to 400 watts or so. However there doesn't seem to be a further contribution of muscular power to the ability to sprint fast among these elite swimmers. One possible reason why that relationship doesn't hold up at the elite level is because as you progress through the ranks as swimmers progress through the ranks all the way from being a novice C or B level swimmer, up to the ultimate or the national team level, it could be that the relative contributions of propulsion and reduced resistance to their performance changes as they go through these performance levels.

Thinking that maybe propulsion doesn't contribute as much to the performance at the elite level one alternate explanation is that maybe at that level there is higher premium that needs to be placed at reducing resistance. To try and answer that question what we plan to do is use two years worth of pretty good data on power rack testing that we have done at the different camp levels that have been coming into the training center in Colorado Springs. We've have already broken those groups into their respective performance categories and we are taking a look at whether or not there are any significant differences among them with regard to their ability to generate propulsive power. We will probably be able to share those results with you in two to three months or so, right now we are in the process of analyzing that data.

Another study that we are currently involved in is the longitudinal study of the resident national team. Jonty is the coach leading the way. We're in there and we're trying to help him keep track of the swimmers and find out as much as we can about how things are progressing during the course of both of the seasons that we will be involved with then from last year and this year leading up to the Olympic Games. One of the things that we are doing on a fairly regular basis with these athletes is a blood lactate test. He's doing a T-30 and we're collecting those results and keeping track of how the T-30 test is changing over time. Another thing we have is a test that we introduced with this team that measures or estimates the amount of active drag or the amount of resistance that they experience when they swim at different paces. We are also measuring to get an idea of what their capabilities are in propulsive power. We are doing filming with them and digitizing their strokes and calculating stroke forces and those things that you are already familiar with. In addition to frequently testing them on the power rack to get a more global marker in their ability in generating propulsive power, we are taking blood samples periodically that we run through our clinical lab and we measure certain blood markers of certain training status, including things like CPK, iron status and some of those

variables. That study will not be completed until we reach Atlanta when they go off and compete. Hopefully everyone in that Resident Team makes it on the Olympic Team and at that time, we'll have all that data collected and that's when we can sit down and try and analyze what the results are and match up of some of these physiological changes with some of the things that might of gone on in their training over the two years.

Later this fall we will be collaborating with a good friend and colleague, Mike Sherman, on trying to find out if there is an effective creatin ingestion. You have probably seen some of the advertisements concerning the creatin products. What we want to do is to find out, using a well defined double blind study, whether creatin ingestion has an influence both on sprint performance and on the ability to do sprint training. What we have proposed is a six week study that be both used on male and female swimmers, that will be placed into two separate groups where they will be matched by ability and by stroke. One group will be a placebo group and the other will receive the experimental treatment. The researchers and the subjects will not know who is receiving placebo or receiving experimental stuff until after the study is over with. So of the measurements that are being purposed, are a test set of six 50's on 3 minutes, done every week or so to know how well they could perform in the repeated sprint type environment. We're trying to get some data on 25 through 100 yard time trials. We'll look at their competition performance during that time.

We'll do some testing to see if there is an effect on muscular power or strength. Another test set that we threw in there is 12 100's on 2:30 and the reason we wanted to have that in there is because that's a test that will probably gives us a better reflection of lactate tolerance. And although nobody has come up with a claim that creatin ingestion might improve lactate tolerance, there is the possibility that it could and so we thought it

would be a good idea to have a test set in there that would reflect that capability. Sometime around the end of 1996 is when we will have the end of that study in.

A project that we are involved in right now, that Jane Cappaert is running, involves the biomechanics of turns. The underlying question involved in that study is "what makes for a fast turn?" John Walker who is one of our graduate students at ICAR will be presenting one of these results tomorrow at this meeting, so if your interested in some the details I would recommend that you look him up on the program to see if you can get in there and spend some time. We have results on swimmers that range all the way from young age group novice level swimmers up to the elite level. The measurements that are being analyzed at this point in time include things such as the speed going into the wall, body position at the contact point, how much time do you spend on the wall, what's the force of the push off, and what's the direction of that push off. We will be measuring the speed coming off of the wall, and speed out to certain markers in the pool. Then, of course, we have to measure the overall turn time. Some the results are already available but we expect to give a final report somewhere in the range of December 1995 or January 1996.

This coming year what we plan to do right away is to get started with doing this survey research where we are going to try and find out some information about training patterns used or currently in use in a lot of our age group programs around the country. This will involve a survey of age group swim coaches. We will be asking questions to try to get an idea of how much time is spent in the water, how much time they have available for training. We will look at that in terms of how is that time distributed between training for endurance and speed, how much time in stroke instruction, how much time spent in drill work, how much time in dryland for flexibility, how much time

and what types of training are you doing in the way of strength. Based on some of that information we will design further studies to generate some information that will be useful for age group programs.

Another study that is being done in collaboration with an outside investigator is examining some of the human behaviors of female competitive swimmers. We will be looking for the frequency or the incidents of eating disorders or eating behaviors that are disordered. It might be among both high school and college aged competitive swimmers. This study is being headed by Jackie Burning and she is doing this in collaboration with Joel Stager, who is at Indiana University and has taken over as the editor of Journal of Swimming Research. The plan is, as soon as all of the surveys are collected, to classify swimmers by performance ability and we will be looking for whether or not there are any differences in attitudes about eating frequencies, of certain food choices, about how they feel about themselves, there is a scale for self efficacy, what external pressures they feel that might relate to any eating disorders that they might experience and also internal pressures. We have the target date for finishing the analysis on that and turning in a report in June of 1996.

Last but not least, I like to share with you some of the projects that we would like to get started on some time probably within the next year or so. To an extent this is based upon one of the first surveys that I did of coaches to find out what kinds of issues they were interested in. This was done in a very informal way. When the National Coaches College was held out in Colorado Springs in May I thought this would be a good time to ask a few questions of our leading coaches as to what kind of research topics they would like to see us do. I asked questions like: What priorities would you put on these studies? Short versus long rest in training? What's more important in training to developing a sprinter?

That last question actually came out as the number one topic in the survey so I think that we'll put that as a high priority. I also believe myself that we probably don't use enough rest in interval training of sprinters. So we will try to get on that as soon as we can.

We want to go back and reexamine the validity of the T-30 pace prescriptions. Those times or those adjustments, that supposedly you can make from the T-30 test in order to have swimmers train in certain training categories — I'm not sure that anyone has really done a very good job of establishing what the validity and reliability of those adjustments are, so we would like to get it involved in some work that will help us understand to what extent we might have some error in that regard. That came out as the second rated topic in the coaches survey.

In addition to that, probably at the same time we would like to take a look at the validity of some of the various heart rate methods that are available for pace prescription. That was also a very highly ranked topic by the coaches. Right now there are a number of different heart rate methods that are being purposed. Including, I hear from the Australians that Bob Trafene has them convinced that they can use what he will refer to as a critical heart rate which really amounts to a max heart rate minus 10 beats per minute. And everybody would train at that critical heart rate. There are also other heart rate methods that are available and we would like to check out the validity of those to see what the error is with regards to how well those different heart rate methods might work.

A topic that we are going to get started in and investigating on a pilot basis in the next two months or so, is the question of does endurance in swimming improve more as a result of an improved lactate threshold or as a result of decrease in their active drag or a decrease in resistance. The reason why that is an important question for us to ask is because a lot of coaches and scientists that I have talked to that have followed the lactate thresholds of competitive swimmers are suggesting or seem to be finding that there can be, or there is at least evidence, that the lactate threshold may continue to improve, despite the fact that aerobic endurance doesn't really improve a great deal. Now how could a lactate threshold improve without having some organic cause of it or some physiologic cause? It can improve by decreasing the amount of work that one has to do to go a given speed. Standing on the deck and watching the Russians train, when they came out here it looked to me like their primary focus is on keeping the act of drag as low as possible during the training and using that more than physiologic training in trying to move their swimmers forward and improving their lactate threshold throughout the season. So, we are going to get started on a pilot bases with trying to develop a few methods that will allows us to start studying that question in the next couple of months.

The other one we would like to get into relatively soon and I didn't have this one on the coaches survey because I had no idea that we were going to have a towing system in Colorado Springs at the time but, now we have a towing system. And one of the things that we think that towing might be effective in doing is teaching swimmers how to make body movements or how to position their body during stroking in such a way that they learn better how to reduce drag. We would like to do a project or two designed at trying to find out if towing is indeed an effective way of teaching that kind of a skill and ultimately whether or not that would be effective in improving performance.