Content:

Introduction

1. The system of applied training science and research with an interdisciplinary sport-specific approach

2. The system of sports medical care and research

3. The impact of rule changes on training and competition strategies
Introduction:

The identification of a country with competitive sports and his representatives is global. Through this sustained interest in successful competitive sports very close and complex relationships have grown between the sports and other social sectors in many countries. This is necessary, since the national competitive development activities can only be significant when there is the direct interaction of the sports organizations with politics, education, business, sport science and the media.

The coaches are considered in these processes as a key "player". Increasingly complex, interdisciplinary teams will be set up to secure the provision of top performances at just the right time. These include a very wide extent, the massive development and expansion of training of scientific research institutes including training centers such as Canberra, Tokyo, Seoul, Colorado Springs and Tehran. In these institutes sport-specific projects can realized in an interdisciplinary way. Investment in science have continued in the past Olympic cycle, and often extended.

Worldwide training and research centers in Australia, USA, Canada, China, Korea, Iran, Germany, Japan, Norwegian, Finland, France, Italy, Spain, Russia, Ukraine, Belorussia, Great Britain etc.

Fig. 1 combined training and advanced research centers all over the world
In general there are the following reasons for the development of the performance in elite sports:

- Structures of Federations oriented toward elite sport
- Experienced coaches
- Training concept oriented toward world’s elite
- Infrastructure which promotes performance
- Performance-motivated athletes / team spirit
- Concentration of the athletes / acceptance of training camps
- optimal organisation of competition performance
- Team work with partners among other things advanced training science
- Training control on the basis of a coaching counselling system

In relation to the scientific support of the elite sport I would like to bring out only three aspects:

1. The system of applied training science and research with an interdisciplinary sport-specific approach
2. The system of sports medical care and research
3. The impact of rule changes on training and competition strategies

1. The system of applied training science and research with an interdisciplinary sport-specific approach

The best way to support the elite Wrestlers by the science is a system of applied training science with an interdisciplinary sport-specific approach. That means the applied training science should be organized together with the coaches and athletes and in an interdisciplinary sport specific approach. That means scientific disciplines as training science, biomechanics, sports medicine and biochemistry should work together for the demands of Wrestling for the benefit direct of the athletes.
Within a team work between scientist with an interdisciplinary sport-specific approach, coaches and athletes the following tasks are important:

- planning of various training cycles (team and individual)
- performance diagnostic
- competition diagnostic
- increase of loads
- regular sport-specific tests (lactate graphs etc.)
- coaches clinics
- analysis of literature to check results of modern training knowledge

**Training control process**

- The *training control process* is an essential task of the scientific support of the elite sport as it can be seen in the following overview:

![Diagram](image.png)

*Fig. 2  example for the training control*
Some of the most complicated tasks of the coaches are the Training control on the basis of a coaching counselling system for an optimal organisation of competition performance.

In the following figure is put together the teamwork of coaches and scientist on the main topics of Wrestling.

![Counselling system coach-athlete](image)

**Fig. 3** Counselling system in wrestling

The control of technical-tactical performance and physical capacity is a steady focal point of the preparation and remains part of the competition concept. Here, a stronger orientation toward the athletes’ individual fight concepts must be established.

To support this process the FILA provides for everyone, everywhere on their website all the bouts for download. In addition, the Dart fish software offers with the “coaches platform" suitable tools for individual video-based technical-tactical analysis. This makes it possible to learn about the Internet of the best wrestlers in the world and to optimize the technical and tactical training.
The FILA thus supports the federations and especially the coaches in the use of modern video- and Internet technology to improve the content of the work in wrestling.

In the following additional examples of the control of the specific wrestling ability within a test device training concept (two video clips of test and training devices, active electro hydraulic fighting robot and gut wrench machine).

Fig. 4 special test and training devices in wrestling
Another example is the load control during the last fourteen days before the main competition of the year. Examination of individual load effect and load processing of training days by the analysis of serum-creatinkinase- and urea activities during direct competition preparation as well as of selected blood parameters (haemoglobin and haematocrit) and of the resting pulse frequency in altitude training with the target to find out individual and group-typical load courses.

To optimize the load and recovery control during the phase of direct completion preparation (10 – 14 days before the main competition) we checked 136 national team members of judo with 2285 lactate and 1244 CK determinations. We found an optimal proposal for the design of high load days and recovery days.

Fig. 5 Comparison of average values of CK-excursions before and after high load days during direct competition preparation (men and juniors /n=117)
Of course the national traditions and possibilities have to take into consideration. Therefore the Wrestling Federation together with National Universities and Institutes should find the national strategies to organize the scientific support of the training process. In this connection the different national training strategies are important. For instance in the focus of the US Wrestlers the focus in training and competition is on power and power endurance at technical variety expense.

On the other hand the Russian wrestlers are concentrating themselves on the technical superiority and they have sometimes problems with the endurance during five bouts per day. Wrestlers from Cuba are mostly strong in technical and physical abilities with problems in tactics and psychology sometimes. In this respect the Iranian wrestlers are great role models because they combine superior technical-tactical behavior with exceptional power endurance and impressive fighting spirit present in front of a great historical background.

2. The system of sports medical care and research
To optimize the medical support of the elite Wrestlers should be created a sports medical network with the Sports Medical Service as the core element, but also with close links to the researchers, the national team coaches, the elite sports clubs and the physicians in charge of the national and club teams. Some of the main topics could be:

Sports Medical Service:

- health care
- prevention to avoid injuries and overload problems
- biochemical measuring values (lactate control etc.)
- sport specific ergometry
- determination of biological age
- computer-based monitoring of training breaks caused by injuries etc.
- physio prophylaxis for accelerated recovery
- performance diagnostic
- support of the Anti-Doping regulations

3. The impact of rule changes on training and competition strategies

The complex influence of competition rules to the individual technical and tactical competition behavior is obvious and therefore also constantly the subject of discussions and debates. Rule changes have been the subject of several studies in the past. In 1994 the impact of rule changes on the training and competition design of the seventies, eighties and nineties were shown in a scientific paper. Rule changes and their influence on the competition strategy were also studied in the annual Coaches Clinics of FILA.

The negative peak in terms of attractiveness wrestling especially in the Greco Roman style we have seen at the Olympic Games in London in 2012, when we have had Olympic champions with an average of less than one technical point per minute and this ensured the win with defense actions.
We could be happy that the Iranian wrestlers did not followed among some other nations this unattractive trend. They saved the attack-oriented winning strategy for the new and better future of wrestling.

The next figure shows the negative development of the Greco-Roman wrestling while in the freestyle disciplines (men and women) this trend were not as evident.

![Diagram showing world top performance 2001 - 2012](image)

**Fig. 7  wrestling quality 2002 – 2012 (old rules)**

With 1.4 points per minute we reached 2013 almost the top values from 1984 and 1994!!

We could stop the downward trend concerning the technical quality since 2005 and came out of the basement in this connection. The unattractive defense strategy, clinch as winning strategy and parterre wrestling has replaced by offensive, standing and active wrestling. The new technical oriented wrestling is obvious in the fact that for instances during the Senior World Championships 2011 we had 49% periods with 1:1 or 1:0 points and 2013 only 12%.

The positive tendency of the Rule changes especially in Greco Roman Wrestling is confirmed by the analysis of the Senior World Championships in Budapest.
The positive development after the new rules and the changing of the technical-tactical behavior becomes also clear if we compare the technical-tactical winning structure. Take downs, throws and gut wrench are the dominating techniques now. „Out“- techniques were suppressed and lifts are coming again.
In summary it may be said that coaches and scientists should go together to put the questions, to find solutions and to solve the problems for the benefit of the wrestlers.