



Government of **Western Australia**  
Combat Sports Commission



# Contestant Safety Strategy to Address Rapid Weight Loss (Weight Cutting) by Dehydration

**CSC**

PREPARE WELL  
PERFORM BETTER



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# Executive Summary

## Overview

Rapid weight loss (weight cutting) by dehydration is a dangerous practice often undertaken in combat sports. Contestants rapidly decrease their body weight before weigh-ins through excessive dehydration, for the purposes of gaining an advantage by competing in a weight class below their normal fighting weight.

Contestants then attempt to regain the lost weight in the time between the weigh-in and the contest (usually about 24 hours in Western Australia), with the intention of being heavier than their opponent in the contest.

Many physiological and psychological symptoms demonstrate that weight cutting by dehydration is harmful to all contestants.

In addition, while contestants may be able to regain most or all of the rapidly lost weight, there is research to suggest that contestants are not adequately hydrated at the time of the contest, so creating an increased risk of injury, which can prove fatal.

The Combat Sports Commission (the Commission) has developed a Strategy to address this dangerous practice which is outlined in this Executive Summary and in greater detail at the end of this report. The Commission is keen to provide the safest possible environment for combat sports in Western Australia.

## Consultation

In the development of the Strategy, the Commission provided opportunities for relevant stakeholders to assist in the shaping of the Strategy. The Commission contacted all registrants to participate in the consultation process. The Commission conducted initial one-to-one interviews followed by a series of workshops. The Commission thanks all those involved in the consultation process to date for their time and effort in assisting to make combat sports in Western Australia safer.

## Public Comment

The Commission has released this report for further public comment and welcomes any feedback in relation to any aspect of the report or Strategy. The public comment period will close on 31 January 2019.

Please send all comments to the Combat Sport Commission using either of the following methods:

- Email: [combatsport@dlgsc.wa.gov.au](mailto:combatsport@dlgsc.wa.gov.au)
- Mail: GPO Box 8349, Perth Business Centre, WA 6849

## Research

The Commission undertook extensive research into the many aspects of weight cutting including:

### ○ Health Implications

The research identified many dangerous health impacts caused by weight cutting, including:

- decreased muscle strength and endurance;
- heat illness;
- electrolyte problems;
- mood swings and mental changes;
- decreased kidney function;
- decreased heart and cardiovascular function;
- reduced energy utilisation, nutrient exchange and acidosis;
- eye trouble;
- increased risk of brain injury; and
- loss of life.

### ○ Effect on Performance

The effect on performance in the contest is a complex and multivariate subject where more study is needed. However, the indications from the available research is that there is a statistically significant decrease in aerobic and anaerobic performance from weight cutting.

### ○ Dehydration Testing

The Commission engaged a team from the Curtin University School of Physiotherapy and Exercise Science Centre for Sport and Recreation Research to undertake a review of all relevant literature, to determine the validity and practicality of dehydration testing in a short space of time in a combat sport environment.

The review found that there are many methods to monitor the hydration status of an individual with varying degrees of accuracy and practicality. The methods that are accepted as highly accurate are not often practical, and methods that offer more practicality, are less accurate.

### ○ Other Jurisdictions

The Commission canvassed other combat sports jurisdictions to identify the measures that are being imposed around the globe to address weight cutting.

## Strategy

The Strategy to address weight cutting is outlined below. The Strategy has been developed after extensive deliberation over all the options available to the Commission.

The Commission will undertake an evaluation of the success of the Strategy after it has been in effect for at least six-months. If the evaluation concludes that the dangerous practice of weight cutting is continuing, then the Commission may impose a strict secondary weigh-in or same day weigh-in or any other amendments it deems necessary.

The Strategy is based on the following four pillars:

1. Dehydration Assessment
  - i. Pre-contest clinical assessment to identify significant dehydration
  - ii. Urine specific gravity (USG) test to support the clinical assessment if determined
2. Weight Assessment
  - i. Single weigh-in attempt
  - ii. Weight classes only: removal of 'catch' (agreed) weights
  - iii. Contestants to weigh within weight class range
  - iv. Secondary weigh-in closer to the time of the contest (data collection)
  - v. Amendments to the Certificate of Fitness
3. Regulation
  - i. Prohibit rapid weight loss (weight cutting) by dehydration through the Commission's Code of Conduct
4. Education
  - i. Mandatory online education assessment
  - ii. Introduction booklet
  - iii. Industry education package
  - iv. Contestant Record Book information card
  - v. Updated guidelines to reflect changes resulting from the Strategy

## Contestant Safety Project - Opportunity Statement

Written by participants of the industry consultation.

*"Our opportunity is to deliver the safest possible environment for combat sports participants that is manageable for promoters and trainers. We will do this by developing and implementing a comprehensive range of practical and cost-effective strategies, which results in a mindset change amongst all stakeholders to the combat sports industry, with regard to weight cutting by dehydration. Safety First Always"*



## SECTION 1: Consultation to Date

As part of the Project, there were a number of opportunities for interested parties to participate in the development of the Strategy.

An expression of interest was sent to approximately 1,300 Commission registrants, offering the opportunity to be part of the Project. The participation in the consultation was as follows:

- 16 people responded to the expression of interest;
- 11 people participated in one-to-one interviews;
- 9 people attended the first consultation workshop; and
- 5 people attended the second consultation workshop.

### One-to-one Interviews

The Commission devised a series of questions aimed at gathering information on the culture, the perceptions and the drivers of weight cutting and ideas on how to address the issue. The overall sentiment from the responses was an overwhelming desire for change from the existing weight cutting culture.

Some of the comments from the consultation are below.

#### Weight cutting culture

- "It is a widespread issue from amateur to professional combat sports."
- "The culture is to gain the advantage or to try to match the advantage of the opponent who may be weight cutting to gain the advantage."
- "There has been the development of a bad culture that the industry accepts."
- "Weight cutting is an old idea that has always been done."
- "The culture is to cut as much weight as possible to then put it all back on after the weigh-in and be heaviest by the time of the contest."
- "People that challenge weight cutting behaviours are looked down upon."

#### Driving forces behind weight cutting

- "There is pressure from trainers and an expectation that contestants will cut weight."
- "The culture is the driving force. Fighters want the advantage and more importantly nobody wants to get seriously injured by a bigger opponent."
- "The nature of the sport, trainers."
- "Senior people in the industry and trainers/coaches."

- “Trainers are the drivers. Contestants and parents listen to the trainers. Trainers are misguided about the edge the increased size gives.”
- “Trainers are definitely the drivers. They need to be targeted by the Strategy. The trainers are the ones that set the goals for the contestants.”
- “Coaches and 'bro science'. Lack of understanding, no consequences for coaches/those promoting the culture.”

#### Ideas to address weight cutting

- “Bans for people encouraging or undertaking weight cutting.”
- “Education. Targeting of the senior and prominent figures in the industry. Make hand outs and guidelines available at gyms.”
- “Annual body composition scans.”
- “Competitors can only compete in weight divisions where they cannot cut a large amount of weight with very little body fat.”
- “Regular weight checks of competitors by Commission personnel.”
- “Measure dehydration.”
- “Revert to weight divisions.”
- “There should be consideration of the impact of the Commission's Strategy on international contestants. WA's attraction of top fighters may be impacted.”
- “More training and education for matchmakers as they are the ones that can influence the appropriate weights of matches. Also, restrictions on who can become a matchmaker.”
- “Stop any gym putting fighters forward that are clearly weight cutting. Put more onus on gym owners.”
- “Address the industry leaders to address the culture and change the stance.”
- “Show the negative results and promote safe weight cutting through more natural longer-term methods.”
- “Educate coaches and contestants on weight management and weight planning.”
- “Severe penalties for coaches with contestants that are cutting weight.”
- “Target the offending gyms and make them accountable.”
- “Weight division restrictions.”

## First Workshop (4 May 2018)

Following the one-to-one interviews, an industry workshop was held over two sessions with nine people from the consultation group in attendance. A summary of the one-to-one interviews was presented.

The purpose of the workshop was to:

### Develop an opportunity statement (written by participants)

*"Our opportunity is to deliver the safest possible environment for combat sports participants that is manageable for promoters and trainers. We will do this by developing and implementing a comprehensive range of practical and cost-effective strategies, which results in a mindset change amongst all stakeholders to the combat sports industry, with regard to weight cutting by dehydration. Safety First Always."*

### Define the success of the project (comments from participants below)

- Injury rate due to dehydration has lowered
- Cancellation rate due to contestants not making weight decreased
- Better contests
- Retention of competitors in combat sports
- Contestants competing more often
- Educational materials are out there and used – dangers are common knowledge
- A weight control database is in place, populated and used
- A preliminary set of rules and guidelines have been trialled and accepted
- 100% of gym owners, trainers and promoters are registered and their competencies assessed and accredited
- There is an accepted regulatory framework applied to all combat sports – maybe by a State Sporting Authority
- Weight categories are implemented
- Accepted ideas that are easy to implement are put in place quickly

### Identify measures of success (comments from participants below)

- Injury rates
- Fight cancellation rates
- Competitor retention rates
- Results from compliance audits
- Stakeholder satisfaction
- Numbers of people with registrations and evidence of competence

## Second Workshop (5/6 June 2018)

A second workshop was held over two sessions after the development of an interim Strategy. The interim Strategy was presented, debated and refined with the five people from the consultation group in attendance.

The purpose of the June workshop was also to assess the critical success factors that were developed at the first workshop, which were identified as being critical components to the success of the Strategy. The attendees discussed the components that had been included and excluded as part of the Strategy and the reasoning and consideration that had occurred around these decisions.

**Table 1: Second Workshop - Critical Success Factors**

#	Critical Success Factors (CSF)	Included in Draft Strategy (Yes/No)	Comments
1	Complete weight cutting literature review	Yes	Included in the Strategy.
2	Combat Sports Commission to set the rules, establish guidelines and standards for weight cutting and implement regulation of compliance processes e.g. audits	No	Regulation of gym compliance is beyond the authority of the Commission.  A review of rules is occurring parallel to this Project.  The Commission will continue to review ongoing improvements and legislative amendments.
3	Produce educational materials and disseminate.	Yes	The Commission is exploring ways of gaining acknowledgement and agreement of existing registrants.
4	Run educational sessions.	Yes	Consider educational forums for groups e.g. promoters, matchmakers, trainers, officials etc.
5	Define roles, accountabilities and responsibilities of: a. Combat Sports Commission b. Promoters c. Trainers/Coaches d. Participants/Contestants (from registration) e. Medical Practitioners	No	Not part of the focus of the Strategy but relates more broadly to the Commission's communication project. The Commission also publishes information related to roles, accountabilities and responsibilities such as the Code of Conduct for contestants and industry participants.

#	Critical Success Factors (CSF)	Included in Draft Strategy (Yes/No)	Comments
6	Engage the industry in the Strategy.	Yes	Industry has been consulted and engaged and will continue to be so.
7	Get adequate funding to implement weight cutting strategies.	Yes	Within existing budget. However, subject to ongoing review.
8	Not disadvantage stakeholders by fee increases.	Yes	Subject to review.
9	Review and overhaul fee structure associated with combat sports.	Yes	Subject to review.
10	Link education etc. with registration – accreditation etc.	Yes	The Strategy includes mandatory online training.
11	Mandatory ongoing education and maintain registration.	Yes	As above.
12	Establish sharing of best practices from the industry across industry.	Yes	This is occurring via meetings between national combat sports authorities.
13	Use interested parties as champions in the development and delivery of the Strategy.	Yes	The Commission is keen to work with relevant parties.
14	Consider the impact on contestants competing in national and international competitions.	Yes	The Commission is aware of the impacts of the Strategy on international and interstate competitions however the primary focus is health and safety.
15	Implement weight recording (database) for a registered fighter from walk around weight to match weight.	Yes	Weight data will be captured on the Certificate of Fitness. This will include walking weight, proposed contest weight and past contest weight.
16	Review and amend/update the medical forms to include the inclusion of timeframes, body composition and weight cutting tolerances.	Partial	See 15. Also, in conjunction with the implementation of the Strategy, amendments have been made to the pre-contest medical form to include a dehydration assessment.
17	Implement a process to check weights – random checking.	No	This is beyond the authority of the Commission.
18	Commission to have a strong role in regulating the industry and participating in it.	Yes	This is the goal of the Commission.

#	Critical Success Factors (CSF)	Included in Draft Strategy (Yes/No)	Comments
19	Develop and deploy a 'gym standard' so that all gyms adopt best practices.	No	At this stage, regulation of gym compliance is beyond the authority of the Commission.
20	Develop a promoter's checklist to gather info to ensure safe match ups.	Yes	The Commission regularly communicates with promoters and provides feedback on their practice. The Commission has a promoter's checklist on its website.
21	Develop an industry Code of Practice and Behaviours.	Yes	The Commission develops guidelines, standards and a code of conduct. There are participant codes of conduct on the Commission's website.
22	Reduce the validating period of the fighters medical.	No	Intent is to continue to keep it annual.
23	Bigger pool of Medical Practitioners working in the industry.	Yes	The Commission explores this on a regular basis.
24	Include agreed safe weight in match up contract.	No	The Commission will only allow contestants to compete within the range of the relevant weight class.

## SECTION 2: Literature Review

There is a significant amount of academic literature available on the health effects of rapid weight loss and severe hydration. However, there is limited research on the performance effects from these conditions, particularly in a combat sport environment. A review of the relevant literature was conducted to gather the information relevant to the development of the Strategy. The literature review is presented below with key information, messages and ideas from the relevant articles.

### General Overview of Weight Cutting

#### **Weight Loss Strategies in Combat Sports and Concerning Habits in Mixed Martial Arts - Oliver Barley (Australia)<sup>1</sup>**

Results of the study:

- Body mass manipulation was commonly undertaken by all combat sports athletes, with a particularly high incidence of gradual dieting, increased exercise and fluid restriction.
- Body mass manipulation was present in all combat sports with the prevalence and magnitude of acute weight loss greater in mixed martial arts (MMA).
- A total of 637 combat sports athlete's responses were included in the final analysis. The majority ( $\geq 85\%$ ) of all groups reported using a weight loss strategy prior to competition.
- Athletes reported beginning this weight reduction 14 to 28 days prior to weigh-in, except wrestling which reported a significantly shorter time period of seven days when compared with Brazilian Jiu Jitsu (BJJ), boxing, MMA, Muay Thai/kickboxing (MT/K) and taekwondo (TKD).
- A significant interaction was observed between sports for the most amount of weight athletes reported ever losing for a competition (approximately 9.5% of body mass), with MMA reporting a significantly greater reduction ( $> 12\%$  body mass) compared with BJJ, MT/K, TKD and wrestling.
- Additionally, MMA reported losing a greater portion of weight within 24 hours of weigh-in (approximately 4% of body mass).

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<sup>1</sup> Barley, O.R., Chapman, D.W. and Abbiss, C.R., 2017. Weight Loss Strategies in Combat Sports and Concerning Habits in Mixed Martial Arts. *International journal of sports physiology and performance*, pp.1-24

- In most combat sports, it was reported that the majority of weight lost in the 24 hours before weigh-in was recovered prior to competition and the majority of weight lost was typically regained seven days following weigh-in.
- When examining how athletes ranked the influence of others on their weight loss, training partners, coaches and opponents were commonly ranked in the top three influences across all combat sports.
- Over 85% of athletes in each combat sport examined, reported manipulating their body mass to make weight for competition. The magnitude of reported weight loss for a competition ranged from 4-12% of body mass overall, which included, 3.5-7% of body mass within two weeks of weigh-in and 1.5-4% of body mass within 24 hours of weigh-in.
- The amount of body mass loss reported as real-world practice suggests that communication of well controlled scientific research is not impacting on the applied practice.
- The greater magnitude of weight loss in MMA may be explained by the longer period allowed between weigh-in and competition which may encourage the athletes to attempt to lose more weight.

**Table 2: Weigh-in Time vs Weight Loss**

	BJJ	Boxing	Judo	MMA	MT/K	TKD	Wrestling
Weight typically regained between weigh-in and competition (kilograms)	1.3	2	2	5.3	3.5	2.2	2.2
Time between weigh-in and competition (hours)	6	7	11	24	18	19	7

\*This table has been simplified for the purposes of this report. See the full article for the complete table.

- Research has indicated that some of the aggressive weight loss habits observed in this study may negatively influence exercise performance over shorter recovery periods (around three hours) and even up to 24 hours.
- However, the effects of such weight loss on both short-term and long-term health requires further research. It is possible that the high magnitudes of weight loss could result in a number of health complications including cardiovascular problems and increased insulin sensitivity alongside an increased risk of brain damage during competition.



# The Health Impacts of Weight Cutting

## Weight Loss in Combat Sports: Physiological, Psychological and Performance Effects - Emerson Franchini (Brazil)<sup>2</sup>

Psychological effects of rapid weight loss:

- Several investigations have reported that athletes undergoing rapid weight loss presented decreased short-term memory, vigour, concentration and self-esteem as well as increased confusion, rage, fatigue, depression and isolation, all of which may hamper competitive performance.
- Likewise, the lack of concentration and focus can affect the ability of the athlete to deal with distractions during high-level competitions, resulting in poor performance.
- A low self-esteem may result in the difficulty to consider the possibility of winning a match, especially against high-level opponents.
- Confusion can negatively affect the capacity of making decisions during the match and resultant rage may cause a lack of control and, despite the importance of aggressiveness for combat sports, excessive rage may increase the possibility of illegal actions.
- Depression and isolation can result in difficulty in coping with rigorous training sessions.
- A high percentage of wrestlers are quite concerned about their body mass and food intake. Consequently, they resort to frequent dieting or caloric restriction.
- 10–20% of wrestlers feel unable to control themselves while eating, which is a classic symptom of an eating disorder. This number increases to 30–40% after the competition.
- The constant attention directed to body mass control increases the probability of eating disorders such as binge eating, anorexia and bulimia, with higher risk among female athletes.
- The prevalence of overweight and obesity are higher in former combat athletes in comparison with former athletes who were not weight cyclers during their competitive career.

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<sup>2</sup> Franchini, E., Brito, C.J. and Artioli, G.G., 2012. Weight loss in combat sports: physiological, psychological and performance effects. *Journal of the international society of sports nutrition*, 9(1), p.52.

### Physiological effects of rapid weight loss:

- Some epidemiological studies have associated rapid weight loss with increased risk of injuries. One study observed that the 5% reduction in body mass affected metabolism and muscle contraction pattern, thereby increasing exposure to injury. Another study revealed that athletes who had reduced more than 5% of their body mass presented a higher probability of injury during competition.

### Some extreme cases:

- In 1996, three months before the Atlanta Olympic Games, Chung Se-hoon (22 years, 74kg), considered the probable gold medal winner in the 65kg weight category in judo, was found dead in a sauna. The cause of death was a heart attack.
- One year later, three American collegiate wrestlers died due to hyperthermia and dehydration associated with intentional rapid weight loss.
- In 2005, Sansone and Sawyer reported weight loss pressure on a 5-year-old wrestler, whose father was asking him to lose 10% of his body mass to take part in a wrestling tournament.

## Dehydration and Acute Weight Gain in Mixed Martial Arts Fighters Before Competition - Adam Jetton (USA)<sup>3</sup>

- Results demonstrated that 39% of the MMA fighters presented with a urine specific gravity (USG) of >1.021 immediately before competition indicating significant or serious dehydration.
- MMA fighters undergo significant dehydration and fluctuations in body mass (4.4% average) in the 24-hour period before competition.
- Urinary measures of hydration status indicate that a significant proportion of MMA fighters are not successfully rehydrating before competition and subsequently are competing in a dehydrated state.
- Weight management guidelines to prevent acute dehydration in MMA fighters are warranted to prevent unnecessary adverse health events secondary to dehydration.
- Acute rapid weight loss can lead to extreme dehydration. Dehydration or excess body water loss has negative physiological consequences that impair performance and also can be hazardous to one's health.
- These adverse effects include impaired glycogen use, central nervous system dysfunction, increases in core temperature and cardiovascular strain.

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<sup>3</sup> Jetton, A.M., Lawrence, M.M., Meucci, M., Haines, T.L., Collier, S.R., Morris, D.M. and Utter, A.C., 2013. Dehydration and acute weight gain in mixed martial arts fighters before competition. *The Journal of Strength & Conditioning Research*, 27(5), pp.1322-1326.

## Effects of Acute Dehydration on Brain Morphology in Healthy Humans - Matthew Kempton (UK)<sup>4</sup>

- This study measured regional changes in brain structure following acute dehydration.
- Dehydration can affect brain structure which has important implications for human health.
- The study detected the expansion of the ventricular system (brain cavities), with the largest change occurring in the left lateral ventricle, but no change in total brain volume.
- The current finding of subtle increases in ventricular volume after dehydration has several implications: first, the increase in ventricular volume may be important for athletes who use acute dehydration regimes and compete in contact weight-classified sports such as boxing and martial arts.
- Increased ventricular volume could allow the brain to move further in the cranium following a blow to the head, thus increasing deceleration forces as the brain impacts into the cranium. Such rapid deceleration of the brain can cause contusion injuries.
- Clinically, abnormal regulation of fluid intake may adversely affect brain structure and function and should thus be recognised at an early stage.

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<sup>4</sup> Kempton, M.J., Ettinger, U., Schmechtig, A., Winter, E.M., Smith, L., McMorris, T., Wilkinson, I.D., Williams, S.C. and Smith, M.S., 2009. Effects of acute dehydration on brain morphology in healthy humans. *Human brain mapping*, 30(1), pp.291-298.



## THE DANGERS OF CUTTING WEIGHT AND DEHYDRATING



Unhealthy and dangerous weight loss practices continue to be a serious problem in combat sports. One recent study found that 39% of MMA fighters were entering competition in a dehydrated state. Heat illness and death in athletes have already happened in the sports of wrestling and MMA. It's been shown that excessive weight loss, rapid weight loss, and repeated cycling of weight gain/loss causes decreased performance, hormonal imbalance, decreased nutrition, and increased injury risk. Other life-threatening problems associated with improper weight loss and dehydration include:

- **Decreased Muscle Strength and Endurance:** Decreased blood flow to muscles makes them work less well.
- **Decreased Heart and Cardiovascular Function:** The heart works harder *and* less efficiently.
- **Reduced Energy Utilization, Nutrient Exchange and Acidosis:** With decreased blood flow to tissues, nutrients don't get delivered, and the body's waste products do not get removed as well. A buildup of acid occurs which changes cells' functions in the body.
- **Heat Illness:** This takes on four forms: heat cramps, heat syncope (loss of consciousness), heat exhaustion, and heat stroke (which may be fatal). Dehydration results in decreased blood flow to skin and muscles. This is followed by decreased ability to regulate body temperature. The ability to sweat becomes impaired and core body temperature can rise. This increases the threat of all of these to poorly hydrated athletes doing strenuous workouts.
- **Decreased Kidney Function:** Dehydration leads to decreased kidney blood flow and decreased kidney function. This contributes to the problems listed in the points here, in addition to decreased urine output, concentrated urine, and leakage of protein into the urine. (It is not known if these changes can result in permanent kidney damage.)
- **Electrolyte Problems:** Decreased kidney function results in imbalances of electrolytes such as unhealthy increases in potassium and sodium.
- **Mood Swings and Mental Changes:** All of the above contribute to increased mood swings, poor concentration and focus, disorientation and other mental changes.
- **Eye Trouble:** Dehydration can cause blurred vision and dry eyes.
- **Increased Risk of Brain Injury:** There are likely increased risks of brain bleeding and concussion.

### **DON'T:**

- Don't use extreme methods for making weight such as excessive heat methods (rubberized suits, steam rooms, saunas), excessive intense bouts of exercise, vomiting, laxatives and diuretics.
- Don't use dehydration as a mainstay of making weight. In addition to the above, it puts you at risk of improper rehydration techniques — when, in reality, proper re-hydration takes several hours to days. (Many cases of intravenous fluids being used for rehydration after weigh-ins have been reported – this is a doping violation with several organizations.)

### **DO:**

- Commit to year-round proper diet and training for proper weight control and body composition.
- By maintaining your weight year round near an appropriate competition weight and not competing in a weight class outside your appropriate weight class you will help avoid large swings in weight.
- Maintain a good state of hydration by drinking fluid throughout the day and staying hydrated during workouts.
- Follow nutritional programs that meet your needs for adequate amounts of calories from a balanced diet high in healthy carbohydrates, the minimum requirement of fat, and appropriate amounts of protein.
- Be wary of nutritional supplements as they are not regulated by the FDA and some have been shown to be harmful.

For more information visit: [www.associationofringsidephysicians.org](http://www.associationofringsidephysicians.org)

<sup>5</sup> [http://www.dca.ca.gov/csac/forms\\_pubs/publications/dehydration.pdf](http://www.dca.ca.gov/csac/forms_pubs/publications/dehydration.pdf)

## Effect on Performance

### Optimising Acute Body Mass Management Practices in Australian Olympic Combat Sports - Reid Reale (Australia)<sup>6</sup>

- The magnitude of rapid weight loss before weigh-in is commonly reported at around 5% of body mass across all combat sport athletes; however, differences exist in the time spans over which the weight is lost and how frequently this occurs.
- Fighters commonly lose  $\geq 5\%$  body mass in the week prior to weigh-in. Although there is indirect evidence (correlations between post weigh-in weight re-gain and competition success) suggesting these practices do enhance competitiveness, they are sub-optimal in terms of health and performance.
- While we acknowledge that there is no single 'ideal' acute weight loss target, a key concept of this paper is the pragmatic recognition, under some conditions, acute weight loss of 5-8% body mass with an acceptably small impact on health and performance may be possible.
- Extremes in acute weight loss are also evident, with some athletes reporting acute losses greater than 10% body mass.
- Negative performance and health consequences of such severe weight loss have been well documented not only within combat sport athletes but across varying athletic populations.
- In the extreme, severe weight making practices have resulted in deaths, as was the case in November 1997, when three American wrestlers died following food and fluid restriction in conjunction with the use of vapour impermeable suits while exercising in a hot and humid environment.
- Further, position statements from the American College of Sports Medicine, The Association of Ringside Physicians and the National Athletic Trainers Association warn against extreme practices and recommend further rule changes across sports to discourage large magnitudes of acute weight loss and specific methods of weight loss.
- Rule changes regarding altered weigh-in time frames relative to competition, identified minimum competition weight requirements (based on body composition assessment) and testing of hydration status appear effective in decreasing extreme weight loss practices.

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<sup>6</sup> Reale, R.J., 2017. Optimising Acute Body Mass Management Practices in Australian Olympic Combat Sports

- However, when these same athletes (who reduced their extreme practices following rule changes) compete in competitions which do not implement such rules, extreme practices resume. Thus, despite the well documented negative effects, plus medical and health authorities' efforts to discourage the practice, athletes continue to follow longstanding patterns of weight cutting in order to make weight.
- Perhaps one of the greatest factors reinforcing weight cutting practices is the opportunity for recovery post weigh-in. Following acute weight loss, performance in activities demanding high contributions of aerobic and anaerobic metabolism are typically compromised as are (albeit to a lesser degree) activities demanding high power output and absolute strength.
- However, much of these physiological disturbances may be reversible following nutritional recovery post weigh-in. Indeed, two and a half days of 'sweating' plus food and fluid restriction, resulted in no change in anaerobic capacity determined via a one-minute Wingate test, following five hours recovery.
- Aside from the recognition that the time available post weigh-in provides opportunity to restore physiological function, at least in part; combat sport athletes report deriving a 'sporting identity', a sense of focus and commitment and the feeling that they are 'a real athlete' when engaging in the weight making process. Furthermore, it may serve as a coping strategy and create an increased sense of focus and commitment.
- In terms of chronic practices, the International Olympic Committee released a consensus statement in 2014 detailing the issue of chronic energy deficits in athletes attempting to chronically manage body mass and the potential detrimental effects on; lean mass maintenance, immune function, bone health, metabolic rate and hormonal processes.
- Combat athletes report that coaches and team mates, as well as their personal desire to win, are the biggest influences on their decisions regarding weight loss efforts.
- Rule changes in American college wrestling, including reducing the recovery time post weigh-in and identifying a 'minimum wrestling weight' (MWW) based on pre-season body composition measurements, have been associated with a decline in extreme acute weight loss practices in this cohort.
- The potential for performance impairment in response to acute weight loss techniques appears obvious, yet the impact of these practices on sport performance remains somewhat an issue of conjecture.
- While activities that demand high power and strength outputs are less likely to be influenced by acute weight loss, performance in activities that require significant contributions of aerobic and anaerobic metabolism to energy yield are typically compromised.

- Several mechanisms have been proposed to explain the implications of acute weight loss on performance. Hypohydration or lowered plasma volume coupled with depletion of muscle glycogen stores has been proposed to underlie the performance decrement associated with acute weight loss.
- Indeed, in studies where ample time and appropriate recovery strategies have followed the “weigh-in”, the acute negative performance effects of the acute weight loss have been found to be reversible.
- It has been reported that large body mass regains correlated with competitive advantage in high school wrestlers, but not in collegiate wrestlers at a national championship.
- In contrast, no association was found between body mass re-gain and competitive success in teenage taekwondo athletes and raises physical differences in the activities involved in combat sports as a potential confounder in the importance of body mass manipulations.
- The case could be made that in less experienced athletes, where skilled performance has not yet been optimised, physical status and weight manipulation contributes more to success than in elite athletes.
- The findings from this study confirm that in the Olympic grappling sports of judo and wrestling, acute weight loss pre-weigh-in likely provides a competitive edge, whereas in the Olympic striking sports of boxing and taekwondo this is not the case.
- One explanation for this lies in the technical differences between striking and grappling. Grappling involves the manipulation of an opponent’s body mass and the imposition of one’s own body mass on the opponent, whereas striking competitions tend to rely more on the strategic and tactical movement of one’s own body mass. Indeed stature (and thus reach) may be more important in striking.
- For combat sports that implement weigh-ins the evening before competition day, there is opportunity for adequate restoration of fluid and fuel status; furthermore, although this is probably achieved in the case of glycogen preparation, many athletes do not attain euhydration.
- In contrast, shorter recovery periods, as occur when weigh-in occurs on the morning of competition do not provide enough time for athletes to rehydrate when they have employed dehydration to the degree commonly practiced.



- The findings of this study suggest a relationship exists between post weigh-in body mass re-gain and competition success. Significant differences in body mass re-gain were observed between medallists and non-medallists, and between winners and losers of each fight.
- We identified physique trait differences across weight divisions, indicating that heavier athletes typically possess greater relative fat mass and thus could potentially make weight through chronic manipulation in body mass alone (avoiding any potential health and/ or performance implications of acute weight loss), increase lean mass within their selected weight division, or even compete in a weight division lower than previously identified.
- On the other hand, lighter athletes typically possess lean physiques, with many incapable of avoiding acute weight loss strategies in order to meet self-selected weight divisions requirements.

## Repeat Effort Performance is Reduced 24 Hours Following Acute Dehydration in Mixed Martial Arts Athletes - Oliver Barley (Australia)<sup>7</sup>

- A study was conducted to determine the influence of acute dehydration on physical performance and physiology in MMA.
- The main observations from this study were that:
  - Ad libitum fluid/food consumption following acute dehydration of 4.85% returned most physiological markers of hydration back to baseline but did not recover body weight 3 hours and 24 hours following dehydration.
  - Aerobic and anaerobic performance (i.e. repeat sled push performance, grip strength and medicine ball throw) was compromised 3 hours and 24 hours following dehydration.
  - Urine specific gravity was higher than the control at 20 minutes and 24 hours following dehydration.
  - These results highlight that caution must be taken when using a single measure to assess hydration. Indeed, hydration status is complex and influenced by fluid shifts among several regions within the body making it difficult to measure.
- Research indicates that dehydration can negatively affect total haemoglobin mass and blood volume for more than 24 hours.
- There is evidence to suggest that following dehydration weight loss MMA athletes are not adequately rehydrating prior to competing.
- Urinary measures of hydration and measures of body mass taken at the weigh-in 24 hours and 2 hours prior to competition indicate that athletes gained 4.4% of their body mass over the 22-hour period, yet 39% of athletes were still competing in a state of significant dehydration (urine specific gravity (USG) of >1.021).
- This study did not seek to determine why there was a decreased performance, only that there was one.
- The study speculated that possible reasons included:
  - increase in cardiovascular strain due to decreases in blood volume;
  - changes in blood flow to the cells impacting substrate exchange;

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<sup>7</sup> Barley, O.R., Iredale, F., Chapman, D.W., Hopper, A. and Abbiss, C., 2017. Repeat Effort Performance is Reduced 24h following Acute Dehydration in Mixed Martial Arts Athletes. *Journal of strength and conditioning research*.

- thermoregulation and accelerating fatigue;
- changes to the electrolyte balance in the body affecting muscle contractility; and
- decreased muscle glycogen.

## Recommended Approaches to Discouraging Rapid Weight Loss

### Position on Weight Loss in Wrestlers - American College of Sports Medicine (USA)<sup>8</sup>

1. Educate coaches and wrestlers about the adverse consequences of prolonged fasting and dehydration on physical performance and physical health.
2. Discourage the use of rubber suits, steam rooms, hot boxes, saunas, laxatives and diuretics for weight cutting, all of which are prohibited by the National Collegiate Athletic Association (NCAA) and state high school associations.
3. Adopt new state or national governing-body legislation that schedules weigh-ins immediately prior to competition.
4. Assess the body composition of each wrestler prior to the season using valid methods for this population. Males 16 years old and younger with body fat below seven percent or those over 16 with a body fat below five percent need medical clearance before being allowed to compete. Female wrestlers need minimal body fat of 12 to 14 percent.
5. At the time of body composition testing, wrestlers should first be tested to ensure they are normally hydrated. Testing urine for specific gravity can be used with less than 1.020 indicating proper hydration.
6. Wrestlers should be discouraged by coaches, parents, school officials and physicians from consuming less than their minimal daily needs. Combined with exercise, this minimal caloric intake will allow for gradual weight loss. Once the minimal weight has been attained, caloric intake should be increased to support the normal development needs and training of the young wrestler.

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<sup>8</sup> American College of Sports Medicine position on weight Loss in Wrestlers  
Case SH, Horswill CA, Landry GL, Oppliger RA and Shetler AC. Weight Loss In Wrestlers. Indianapolis, IN: American College of Sports Medicine; 2016.

## **Consensus Statement on Weight Management in Professional Combat Sports - Association of Ringside Physicians (USA)<sup>9</sup>**

- Scheduling weigh-ins 24 hours or less before the start of competition.
- Establishing a lowest allowed fighting weight (weight class) for competitors through body composition and hydration assessment.
- Combatants should be assessed and certified at their appropriate weight annually.
- Regulatory bodies should also consider adding additional weight classes in certain sports where needed.
- Educational programs should be established to inform coaches, athletes, administrators, promoters and sponsors about the adverse consequences of prolonged fasting and dehydration on performance and health.
- These programs should discourage the use of extreme methods for making weight; i.e. excessive heat methods (such as rubberised suits, steam rooms, hot boxes, saunas), excessive exercise, induced vomiting, laxatives and diuretics.

## **The Need of a Weight Management Control Program in Judo: A Proposal Based on the Successful Case of Wrestling (Brazil)<sup>10</sup>**

- Matches should begin less than one hour after weigh-in.
- Each athlete is allowed to weigh-in only one time.
- Rapid weight loss methods and artificial rehydration methods are prohibited on competition days.
- Athletes must pass the hydration test to get the weigh-in validated.
- An individual minimum competitive weight is determined at the beginning of each season.
- No athletes are allowed to compete in a weight class that would require weight loss greater than 1.5% of body mass per week.

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<sup>9</sup><http://www.ringsidearp.org/resources/Documents/Position%20Statements/Weight%20Management%20in%20Professional%20Combat%20Sports.pdf>

<sup>10</sup> Artioli, G.G., Franchini, E., Nicastro, H., Sterkowicz, S., Solis, M.Y. and Lancha, A.H., 2010. The need of a weight management control program in judo: a proposal based on the successful case of wrestling. *Journal of the International Society of Sports Nutrition*, 7(1), p.15.

# Dehydration Testing

## **Examining the Validity, Reliability and Practicality of Methods to Monitor the Hydration Status of Combat Sport Athletes: A Review of the Literature – Chesher S, Ducker K, Brade C, Netto K and Tye M (Australia)<sup>11</sup>**

The Commission engaged a team from the Curtin University School of Physiotherapy and Exercise Science Centre for Sport and Recreation Research to undertake research into the validity and reliability of clinical measures to detect severe dehydration and the practicality of applying these measures in a combat sports setting. A summary of some of the key and relevant points from the literature review are below.

### **Overview**

- There are many methods to monitor the hydration status of an individual with varying degrees of accuracy and practicality (i.e., to be applied quickly, en masse with only basic training). The methods that are accepted as highly accurate are not often practical, and methods that offer more practicality, are not as accurate.
- The results show there are 11 methods for measuring hydration status in humans, with varying degrees of accuracy and practicality.
- Laboratory methods generally have a greater degree of validity and reliability, while requiring a trade-off of financial or time cost, specialised equipment or professional expertise. Cheaper, faster and more practical methods are more suited to field testing, however, were generally found to sacrifice validity and reliability.
- The combination of multiple practical methods and the continued research into new methods of determining hydration status could yield positive results in finding a method that is valid and reliable but also practical.
- The implementation of any hydration test should be carefully considered with an appropriate level of dehydration chosen to minimise false classifications, particularly the false classification of euhydration (neutral hydration).

### **Blood Plasma and Serum Osmolality**

- Osmolality is a measure of solute concentration, in this case, in the fluid component of the blood. If there is a greater concentration of solutes relative to the fluid component, then an individual is deemed to have a low plasma volume and is possibly dehydrated.

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<sup>11</sup> Chesher, S., Ducker, K., Brade, C., Netto, K., and Tye, M. Examining the validity, reliability and practicality of methods to monitor the hydration status of combat sport athletes: A review of the literature. A report for the Combat Sports Commission of Western Australia. Curtin University Perth 2018

- According to the American College of Sports Medicine (ACSM) Position Statement on exercise and fluid replacement, the measurement of plasma osmolality is considered a gold standard hydration assessment, especially when combined with tracer dilution methods.
- The ACSM's position on using blood plasma osmolality is that this method is not practical enough for use by the average person as the measurement of this biomarker requires an experienced technician to collect and process samples in specialised equipment.

### Tracer Dilution

- Tracer dilution is the second of two gold standard methods of measuring hydration status.
- Tracer dilution involves a tracer (any safe compound that easily combines with water, does not dissolve in body fat, does not bind to any tissues or proteins and moves freely around body compartments) being added to a drink that is consumed by an individual. The accumulation rate of that tracer in body fluids is then measured.
- Tracer dilution assessment of hydration is laboratory based and requires expert administration and interpretation of results, limiting its effectiveness in the field.

### Urine Specific Gravity, Osmolality and Colour

- Urine specific gravity (USG) and osmolality refer to the concentration of waste within a given amount of urine.
- The ACSM's position statement considers minimal dehydration to occur at USG of 1.01 to 1.02 (approximately 1 to 3% BM loss) and severe dehydration at 1.03 (> 5% BM loss).
- Oppliger et al. (2005) measured the sensitivity<sup>12</sup> and specificity<sup>13</sup> of both USG (with a dehydration cut-off = 1.02, matching the ACSM's position statement) and urine osmolality against plasma osmolality as a gold standard. In the case of this study, the condition being determined was dehydration (as opposed to hydration). USG was measured using a refractometer which resulted in a sensitivity of 80% and specificity of 31.3%. These results indicate that 20% of the time a dehydrated individual (>1.02 USG) will be classified as euhydrated, which poses a safety risk to athletes.
- Sommerfield et al. (2016) used the same brand of refractometer (unspecified model) which measured more favourable sensitivity (92%) but lower specificity (10%) urinary indices for males and similar sensitivity (80%) and specificity (29%) for females. The trade-off between these two measures means that more cases of dehydration will be correctly classified, but a large portion of euhydrated athletes will also be considered dehydrated, the consequences of which are not as severe.

<sup>12</sup> Sensitivity: Refers to the percentage of instances where a diagnostic test correctly identifies a positive test.

<sup>13</sup> Specificity: Refers to the percentage of instances where a diagnostic test correctly identifies a negative test.

- McKenzie, Munoz, and Armstrong (2015) examined the utility of urine colour to detect changes in body mass (an indirect measure of hydration status). Using a receiver operator characteristic curve urine colour was 88.9% sensitive and 84.8% specific, considered a very strong result.
- Although the use of urine colour to determine hydration status displays promising results, McKenzie et al. (2015) examined the reliability and validity in a controlled laboratory setting and have not accounted for the fact that an individual's diet, health status and exercise practises can affect the colour of their urine.
- Urine colour is also assessed based on subjective comparison of urine sample colour to a chart and therefore is open to misinterpretation by the assessor.
- Refractometers, hydrometers and reagent strips offer practical means to measure USG, however, there are a number of limitations of these indices to determine hydration status. Dehydrated (and particularly severely dehydrated) individuals may find it difficult to produce a urine sample during or immediately after exercise due to activation of sympathetic pathways.

### **Bioelectrical Impedance Analysis/Spectroscopy**

- Bioelectrical impedance analysis (BIA) is a non-invasive, quick and inexpensive method of measuring total body water.
- It determines total body water by passing a mild electrical current between conductive surfaces which are contacted by parts of the body (usually hands and feet) and measuring the resistance to the current of compartments of the body.
- Bioelectrical impedance spectroscopy (BIS) is slightly different and is dependent on the electrical conductive properties of body tissues.
- This method, while seemingly quick would also require some skilled test administration and interpretation of results. Goncalves et al. (2015) indicates that BIS may not be suitable for measuring individuals to the extremes of body composition (very lean, large excess of body fat or large amounts of muscle mass).

### **Subjective Measures of Dehydration**

- The following subjective descriptors were suggested as possible signs of dehydration, furrowed (obvious and deep grooves) tongue, sunken eyes, dry axilla (armpit), inability to spit, decreased skin turgor (skin elasticity), dry mucous membranes and perception of thirst.
- None of the subjective measures assessed by Levine et al. (2016) had a high enough combined sensitivity or specificity to be used in accurately identifying the dehydration status of an individual.

- The descriptor with the highest sensitivity (95%) was sunken eyes, however had low specificity (26%) and the descriptor with the highest specificity (96%) was unable to drink, or drinks poorly had low sensitivity (13%).
- These variables require a skilled and reliable interpreter to accurately assess the signs of dehydration.

### **Salivary Indices**

- The rationale behind this method is that dehydration causes a relative elevation in sodium levels in the extracellular compartment, potentially affecting the sodium concentration gradient necessary for water movement between the plasma and saliva, which results in reduced saliva secretions and raised osmolality.
- Limitations of this method include the possible inability of an individual to provide a sample, the requirement of a centrifuge and professional to analyse and interpret the results. It is standard that this method requires the samples be spun for several minutes and therefore may not be useful for testing a large number of individuals rapidly around weigh-ins or competition.

### **Ultrasonic/Sonographic Cardiac Assessment**

- Ultrasound and sonography are currently used in emergency and critical care by clinicians measuring intravascular blood volume from central venous pressure and stroke volume variation, both of which require some preparation and invasiveness.
- The overall lack of procedural details and comparison to a gold standard test mean that higher quality research is required before these methods can receive proper assessment for validity, reliability and practicality.

### **Sweat Sodium Concentration**

- The premise behind this method of hydration analysis is that sweat is mostly comprised of water and also contains traces of sodium. By collecting the sweat after a bout of activity, an individual's fluid deficit can be estimated by the concentration of sodium in the sweat.
- The main attraction of this method is the ease of collection; however, other forms of biomarker are just as easy to collect (e.g., saliva and urine) and have had more extensive validity and reliability research performed.
- There are dangers that should be considered with this method, as some form of thermal stress must be applied to induce sweating, which has potential risks for individuals in an already severely dehydrated state and will either require substantial time to induce sweating with exercise, or extra cost for specialised equipment.



## Change in Body Mass

- During thermal stress, sweat is secreted from the body as a cooling mechanism, meaning that an individual's sweat loss during a bout of exercise can estimate their level of dehydration (as one kilogram is equal to one litre of water).
- However, there are some other sources of water loss not accounted for in sweat loss (oxidation of glycogen and fatty acids). Meaning that body mass loss may not accurately reflect the amount of water lost by an individual.
- A second limitation is that change in body mass cannot act as a 'one-off' test of hydration due to the requirement for a difference in body mass to be measured, and that during initial weigh-ins the healthy body mass of an individual could be actively altered to present a "normal" initial body mass that is in fact lower than their euhydrated, rested and fuelled body mass.

## Intraocular Pressure

- There is a relationship between aqueous humour (a transparent fluid that coats the eye that is constantly being formed and filtering in and out of the surrounding capillaries), blood pressure and plasma osmolality which has been suggested for use as a non-invasive hydration marker.
- Although the examination of inter ocular pressure is quick, the significant delay of signs of dehydration discovered by Stewart et al. (2017) indicate that there may be some issues determining dehydration in short time frames.

## Air Displacement Plethysmography

- Air displacement plethysmography is a non-invasive method of assessing body composition via the calculation of body density. An individual enters a chamber of which the volume is measured according to the change in air pressure in the chamber.
- Based on the description of the method of measurement it is clear that highly specialised equipment and expertise are required to interpret these measurements.

## Summary

- The combination of a number of field-based hydration tests is likely to enhance the ability to understand an individual's hydration status and therefore the optimal combinations deserve further investigation.
- The validity and reliability of all methods of measuring hydration status can be distorted by the experience, training and competence of the individual administering the test and interpreting the results.

- The equipment used to obtain or analyse biological samples must also be calibrated, cleaned and operated correctly in an appropriate setting (i.e. sterile, appropriate lighting) to ensure that the most valid and reliable results are obtained.
- It is highly recommended that the implementation of any hydration test in the field should be carried out by an experienced professional.
- Careful consideration also needs to be given to the minimum acceptable hydration level (cut-off) specified for each test, as the potential consequences of misclassifying a hypohydrated individual are greater than the consequences of misclassifying an euhydrated individual.
- Methods suitable to be used in the field (e.g., handheld refractometers and osmometers, reagent strips, change in body mass, subjective questionnaires or scoring tools) lack sufficient validity and reliability to quickly and correctly diagnose the hydration status of many individuals around weigh-in and competition.

## SECTION 3: Results from Secondary Weigh-in Data Collection

Between 31 March 2017 and 24 September 2017, the Commission collected secondary weigh-in data, from 426 contestants, at 15 events, encompassing various sports as shown in the below table.

**Table 4: Secondary Weigh-in Data Collected by Sport**

Sport	Contestants
Boxing	76
Kick Boxing	2
Muay Thai	298
Mixed Martial Arts	50
<b>Total</b>	<b>426</b>

Contestants were weighed immediately prior to the event, in addition to the standard weigh-in which normally occurs approximately 24 hours prior in Western Australia.

An analyst from Edith Cowan University was engaged by the Commission to undertake a statistical analysis of the data.

The data was split into percentage weight variation categories (weight change between the first and second weigh-ins) at 1% intervals.

**Table 5: Number of Contestants by Weight Variation Categories**

Weight Difference	Contestants
Less than 1%	19
1%	28
2%	30
3%	33
4%	44
5%	42
6%	49
7%	42
8%	37
9%	25
10%	27
More than 10%	50
<b>Total</b>	<b>426</b>

The data was then analysed in terms of weight difference and the success of contest outcomes. The table below shows the win percentages of contestants in Muay Thai, boxing and MMA at each different weight difference category.

**Table 6: Win Percentage by Weight Difference Category by Sport**

Weight Difference	Muay Thai	Boxing	Mixed Martial Arts
Less than 1%	33.30%	37.50%	50.00%
1%	53.30%	44.40%	75.00%
2%	47.40%	0.00%	20.00%
3%	26.10%	14.30%	66.70%
4%	46.70%	50.00%	50.00%
5%	54.30%	50.00%	33.30%
6%	46.20%	50.00%	25.00%
7%	56.50%	71.40%	40.00%
8%	63.00%	100.00%	20.00%
9%	47.60%	100.00%	66.70%
10%	50.00%	60.00%	100.00%
More than 10%	61.50%	60.00%	33.30%

## Conclusion

The overall conclusion from the analysis is that the results vary and are inconsistent depending on the sport and weight cut that is observed. Consistent with other research presented in this report, the results of this study show that under certain circumstances, weight cutting can give competitive advantage however under different circumstances it may hinder performance and prove to be fatal.

# SECTION 4: Existing Approaches to Addressing Weight Cutting

## California State Athletic Commission (CSAC)

The CSAC regulates professional and amateur boxing, kickboxing and MMA throughout California by licensing all participants and supervising the events. The Commission is dedicated to the health, safety and welfare of the participants in regulated competitive sporting events, through ethical and professional service.<sup>14</sup>

The CSAC approved the 10-point plan to curb severe dehydration and weight cutting for MMA athletes on 16 May 2017.

### 10-Point Plan

1. Requesting MMA fighters to select the lowest weight class in which to compete and asking questions about weight cutting and dehydration to take into consideration prior to approving fights. The listed division must be declared safe by a physician on a licensee's paperwork.
2. A contestant who fails to make weight is fined 20 percent of his or her show money, with 10 percent going to the commission and 10 percent going to the opponent, in addition to a 20 percent fine of the contestant's win bonus, with all of the money going to the opponent.
3. Four additional weight classes – 165, 175, 195 and 205 pounds – to give athletes more choice.
4. Policy changes to the way matches are approved with an emphasis on appropriate weight class.
5. Weight class restrictions for fighters who miss weight more than once. Those fighters may be required to compete in a higher weight class until a physician certifies it's appropriate and the commission approves.
6. Continued early weigh-in procedure to allow fighters the maximum amount of time to rehydrate.
7. A second weight check on the day of the event to ensure fighters haven't gained back more than 10 percent of their body weight. Fighters who gain excessive weight may be asked to move to a higher weight class.
8. Checks for dehydration by specific urine gravity and/or a physical by CSAC physicians.
9. A recommendation of a 30-day and 10-day weight check for "high level title fights," similar to those done by the WBC in boxing matches.
10. Examination and education for matchmakers, promoters, trainers and athletes on offering, accepting and contracting bouts.

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<sup>14</sup> <http://www.dca.ca.gov/csac/>

## Alabama Athletic Commission (AAC)

The AAC established reforms to address weight cutting in effect from 5 August 2018.

Executive Director Jody McCormick commented that “Alabama’s changes are on a smaller scale than California’s, which is appropriate, given the relative sizes of the two commissions.”<sup>15</sup>

The reforms are as follows:

- fighters who miss weight more than once will be required to move up a weight class unless cleared by a physician;
- all weight misses will be recorded by Alabama and added to the Association of Boxing Commissions (ABC) database, including the fighters that the commission has required to move up in weight class due to multiple misses;
- adoption of morning weigh-in as its official weigh-in;
- addition of a fight-day weight check, and if a fighter is 10% above the contracted weight, fighter will be asked to move up a division going forward; and
- dehydration will be checked by doctors during the official weigh-ins and the fight-day weight check.

## Brazilian MMA Athletic Commission (CABMMA)<sup>16</sup>

Director of Operations for the Brazilian MMA Athletic Commission, Christiano Sampaio, argues that “the timing of weigh-ins won’t address the problem of weight cutting at the scale that exists in combat sports. Giving fighters a wider target within divisions will.”

The Brazilian Commission has been collecting data on fighters and weight from events it has regulated – including four UFC events – since it adopted the California State Athletic Commission’s 10-point plan on weight-cutting in July 2017. “One of its key takeaways from the numbers, Sampaio said, was the need to change the definition of the currently accepted weight classes. Rather than a division’s weight representing a limit, it should mark a starting point that cuts off at the next highest division.”

Sampaio said “allowing a higher range of weights – while still keeping the numbers associated with current divisions – will encourage fighters to compete closer to their natural mark and keep them from coming into the cage dehydrated.”

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<sup>15</sup> <http://www.mixedmartialarts.com/news/alabama-ac-head-calls-on-all-regulators-to-address-weight-cutting>

<sup>16</sup> <https://mmajunkie.com/2018/06/brazil-commission-cabmma-proposal-weight-cutting-solution-shift-divisions>

## International Federation of Muay Thai Amateur (IFMA)

IFMA is the sole recognised sport governing body of amateur Muay Thai consisting of 130-member countries worldwide with five continental federations. In 2017/18, IFMA issued an update to its medical check procedure for all athletes which had a focus on weight cutting and dehydration.

### Medical Declaration Form<sup>17</sup>

IFMA rule 6.1.3 states that:

“All athletes competing at all IFMA international level events must have completed the IFMA Athlete’s Medical Declaration form signed by their doctors prior to leaving their home countries for an event. This form must be duly completed and submitted together with their boxer’s book at weigh-in.”

The IFMA medical declaration includes:

- The recording by the physician of the athlete’s weight with remarks of whether the athlete is fully hydrated, and evaluation of under-skin body fat.
- The weight is used as the marker for the athlete’s weight category for the season with maximum allowance of +/- 10%.

The declaration also includes the following messages to the athlete/coach/guardian:

- “IFMA acknowledges that weight cutting by means of dehydration, loss of water and minerals from the body may pose a dangerous and life-threatening result, even in amateur sports and young athletes. At IFMA, we support weight control by fat loss, NOT BY water loss. We therefore urge all athletes, entourage and stakeholders to take responsibility in this process for the health of the athletes.
- Doctors on duty at the daily medical check are authorised to perform on-the-spot urine spectrometer tests for dehydration on any athlete at any given time should symptoms of dehydration be suspected. Any athlete with a urine density above 1.030 shall not be permitted to compete.”

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<sup>17</sup> <http://www.ifmamuaythai.org/wp-content/uploads/2017/12/IFMA-Medical-Declaration-for-Athletes-V.6.pdf>

## ONE Championship

ONE Championship (formerly known as ONE Fighting Championship or ONE FC) is a Singapore-based MMA promotion which was launched on 14 July 2011.

In December 2015, 21-year-old Chinese contestant, Yang Jian Bing, passed away as he was cutting weight for ONE Championship's 35th event. Less than two weeks later, the promotion implemented changes to the weigh-in system to improve health and safety. The policy is as follows:

1. "Athletes must submit their current walking weight and daily training weight regularly. Athletes will input and track their daily weight online via a dedicated web portal. Athletes may input data weekly but must include daily weights.
2. Athletes will be assigned to their weight class based on collated data and random weight checks. Athletes are not allowed to drop a weight class when less than eight weeks out from an event.
3. During fight week, weights are checked daily. Urine specific gravity will also be checked the day after arrival for fight week and three hours prior to the event. Athletes must be within their weight class and pass specific gravity hydration tests all week and up to three hours before the event. If an athlete falls outside the weight, or fails a test, they are disqualified from the event. Doctors may request additional testing at their discretion.
4. Catch weight bouts are allowed. However, the athlete with the higher weight will not be heavier than 105% of the lighter opponent's weight.
5. ONE will conduct random weight checks on athletes at our discretion.
6. Athletes may petition to change weight classes outside of the 8-week competition zone and must be within their new desired weight at that time. In addition, athletes must pass a specific gravity urine test when their weight is within the limits of the newly petitioned weight class. ONE doctors can request additional testing to determine the amount of weight drop allowed over a specific time.
7. The usage of IVs for the purpose of rehydration will not be allowed."



## **National Collegiate Athletic Association (NCAA)<sup>18</sup>**

The NCAA is a non-profit organisation which regulates athletes of over 1,200 North American institutions and conferences.

At the start of the pre-season, wrestlers have their body fat percentage assessed, which is in turn used to determine the minimum weight at which they are allowed to compete. The minimum weight set is at 5% body fat for men and 12-14% for women.

Further, wrestlers are allowed only to lose a maximum of two pounds a week (approximately 0.9 kg/wk) from the start of the pre-season to the date of their competition. Weigh-ins are conducted one or two hours prior to the event.

The NCAA uses urine specific gravity of 1.020 or less to ensure wrestlers are hydrated when being assessed for their minimum weight.

### Failure to Make Weight

Any contestant failing to make weight at the designated time shall be ineligible for that weight class.

## **National Federation of State High School Associations (NFHS)<sup>19</sup>**

The NFHS is the body that writes the rules of competition for most high school sports and activities in the United States.

The NFHS implemented new rules from the beginning of 2006-07 season to discourage rapid weight loss.

### Rule 1-3

Beginning in 2006-07, each state association shall develop and utilise a weight management program that includes:

- a (urine) specific gravity not to exceed 1.025;
- a body fat assessment no lower than 7% males/12% females; and
- a monitored weekly weight loss plan not to exceed 1.5% a week.

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<sup>18</sup>[http://www.naia.org/fls/27900/1NAIA/Championships/CoachesCorner/Wrestling/WR\\_WeightManagementProgram.pdf?DB\\_OEM\\_ID=27900](http://www.naia.org/fls/27900/1NAIA/Championships/CoachesCorner/Wrestling/WR_WeightManagementProgram.pdf?DB_OEM_ID=27900)

<sup>19</sup>[https://www.casciac.org/pdfs/wrestling\\_rules\\_changes.pdf](https://www.casciac.org/pdfs/wrestling_rules_changes.pdf)

## University Interscholastic League (UIL) - Texas, USA

The University Interscholastic League (UIL) is an organisation that creates rules for and administers almost all athletic, musical, and academic contests for public primary and secondary schools in the American State of Texas.

Since 1910, the UIL has grown into the largest inter-school organisation of its kind in the world.<sup>20</sup>

### Wrestling Minimum Weight Certification Program Information

The UIL has implemented rules in line with the NFHS and also implements minimum weights at which an athlete can compete.

The UIL does not advocate that a wrestler's established minimum weight is the athlete's best weight at which to wrestle, but simply the minimum weight at which the athlete will be allowed to compete.

Two key components of the UILs rules are the hydration assessment and the minimum weight class certification.

- Minimum Weight Class Certification
  - The lowest weight class at which a wrestler may compete will be determined by predicted body weight at 7% body fat (males) and 12% body fat (females) using skin fold measurements.
  - If the predicted weight, at 7% male/12% female is exactly that of one of the weight classes, that weight class shall be the wrestler's minimum weight class.
  - If the predicted weight, at 7% male/12% female falls between two weight classes, the higher weight class shall be the wrestler's minimum weight class.
  
- Hydration Assessment
  - The hydration test is simply a pass/fail assessment based on the specific gravity level less than or equal to 1.025. A specific gravity level greater than 1.025 would be considered a failure on the hydration test.
  - Hydration level will be judged using a colour chart. If schools or assessors wish to provide dipsticks or a urine specific gravity refractometer and related materials for hydration testing, that would also be acceptable.
  - If the athlete fails the hydration assessment, the athlete will not be eligible for reassessment for 24 hours and must meet the hydration requirement before the skinfold measurement takes place.

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<sup>20</sup> <https://www.sunset.texas.gov/public/uploads/files/reports/UIL%20SER%202013%2084%20Leg.pdf>

## **World Boxing Association (WBA)<sup>21</sup>**

In order to obtain a license or the renewal of a license, all boxers must submit to a thorough medical examination by a physician approved by the Boxing Commission.

The following minimum physical requirements and disqualification shall apply to professional boxers (unless contrary to law of a given region).

### Medical and Safety Guideline 21

No rapid dehydration. If a boxer is more than 5% overweight five days before a fight, he should not be allowed to dehydrate himself and should not be permitted to fight. If he presents signs of dehydration or excessive loss of weight on the day of the fight, he should not be permitted to fight.

## **World Boxing Federation (WBF)<sup>22</sup>**

### General Medical Guidelines for WBF Championship Contests - Guideline 1

The ring physician or physician designated by the local commission shall follow the procedures listed below:

#### (b) Physical Examination:

(xvi) Weight Loss: The Ring Physician shall pay particular attention to the presence of debilitating effects resulting from a strenuous weight loss program, both by foods or fluid reducing drugs, which might weaken the boxer to the extent he should be precluded from boxing in that particular event.

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<sup>21</sup> <http://www.wbaboxing.com/wp-content/uploads/2017/04/APPENDIX-A-amendments.pdf>

<sup>22</sup> <http://www.worldboxingfederation.net/articles/general-medical-guidelines.htm>

## World Boxing Council (WBC)<sup>23</sup>

### Rule 4.14 Safety Weigh-ins

The final and official weigh-in of the boxers shall occur no less than 24 hours but not more than 30 hours prior to a WBC bout due to the possible adverse results of dehydration and subsequent rehydration of boxers to make the required weight limit for a bout.

Further, in order to encourage safe weight loss in advance of a WBC bout, additional official safety weigh-ins are to be held 30 and seven days prior to the official 30-24 hour weigh-in for non-heavyweight boxers. The boxers' weight should be as follows:

- (a) 30-day weigh-in: 4 weeks prior to the bout, the boxers' weight should not exceed 10% of the weight limit for the bout; and
- (b) 7-day weigh-in: seven days prior to the bout, the boxers' weight should not exceed 5% of the weight limit for the bout.

In the event that a boxer exceeds any weight limitation stated above, the WBC may, for the safety of the boxer or his opponent, revoke or deny its sanction of the bout, in addition to any other disciplinary action as it shall deem appropriate in its discretion.

### Rule 4.15 Extraordinary Medical Weight Measures

When necessary, the WBC may require fat tissue laboratory exams on boxers with weight issues to assess their rating in certain weight divisions, and more importantly to protect their health by not allowing their participation in bouts in weight divisions which could put their health in danger.

### Rule 4.16 Medical Examination at Weigh-In

The local boxing commission has the responsibility to arrange for and conduct physical examinations prior to all WBC-sanctioned bouts at the weigh-in ceremony, which shall occur for all weight divisions including heavyweight. The exams shall include:

...direct questioning about the use of any medicines or drugs, or any artificial means for weight reduction.

The local commission medical panel and/or the WBC Supervisor(s) upon the advice of a licensed physician may arrange for the collection of blood and/or urine samples or any other exam if, in the pre-bout medical examination, signs of serious dehydration or drugs are detected or are suspected.

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<sup>23</sup> <http://wbcboxing.com/wbceng/rules?id=555>

## SECTION 5: Strategy to Address Rapid Weight Loss (Weight Cutting) by Dehydration

The Strategy to address rapid weight loss (weight cutting) by dehydration has been developed by the Commission after extensive research and consultation with the industry and Curtin University. The Commission is of the view that the Strategy will significantly improve the safety of combat sports in Western Australia. The Commission will undertake an evaluation of the success of the Strategy after it has been in effect for at least six-months. If the evaluation concludes that the dangerous practice of weight cutting is continuing, then the Commission may impose a strict secondary weigh-in or same day weigh-in or any other amendments it deems necessary.

The Strategy is constructed upon four pillars:

### 1. Dehydration Assessment

- i. Pre-contest clinical assessment to identify significant dehydration
- ii. Urine specific gravity (USG) test to support the clinical assessment if determined

### 2. Weight Assessment

- i. Single weigh-in attempt
- ii. Weight classes only: Removal of catch (agreed) weights
- iii. Contestants to weigh within weight class range
- iv. Secondary weigh-in (data collection)
- v. Amendments to the Certificate of Fitness

### 3. Regulation

- i. Prohibit rapid weight loss (weight cutting) by dehydration through the Commission's Code of Conduct

### 4. Education

- i. Mandatory online education assessment
- ii. Introduction booklet
- iii. Industry education package
- iv. Contestant Record Book information card
- v. Updated guidelines to reflect changes resulting from the Strategy

# Dehydration Testing

## Overview

The Curtin University Report <sup>24</sup> examined the validity, reliability and practicality of dehydration assessment. The reviewed methods of dehydration testing suitable to be used in the field (e.g. handheld refractometers, subjective assessments) lack sufficient validity and reliability to rapidly and correctly diagnose the hydration status of many individuals at weigh-in and competition.

The report states that a combination of field-based hydration tests is likely to enhance the ability to determine an individual's hydration status.

The report recommends that the implementation of any hydration test in the field should be conducted by an experienced professional and that the equipment used to obtain or analyse biological samples be calibrated, cleaned and operated correctly in an appropriate setting (i.e. sterile, appropriate lighting) to ensure that the most valid and reliable results are obtained.

The report also recommends that the implementation of any hydration test should be carefully considered with an appropriate level of dehydration chosen to minimise false classifications, particularly the false classification of euhydration (neutral hydration).

On the basis of the report, all contestants must be clinically assessed by a medical practitioner, which may be validated by a urine specific gravity (USG) test. USG is a measure of the concentration of salts in urine comparing specific gravity of urine, with the specific gravity of water. Medical practitioners identify the symptoms and signs of dehydration, then if considered appropriate, the medical practitioner can verify the assessment with a USG test.

The validity of USG testing was questioned in the Curtin University Report as it has a high rate of false positives (hydrated individuals are often misclassified as dehydrated). The literature also reports an 80% (higher in some studies) accuracy in identifying dehydrated people. These factors contribute to the report's assertion that this method is not suitable as a sole measure for field testing. By sampling only dehydrated individuals (based on a medical practitioner's clinical assessment), the potential for misclassifying hydrated individuals is reduced, so the validity and reliability can be maximised.

Ultimately, there is no perfect method to assessing or identifying dehydration. So, an integrated approach utilising a clinical assessment by a medical practitioner at the 'pre-contest' medical assessment, together with the USG test would improve validity and accuracy of the diagnosis.

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<sup>24</sup> Chesher, S., Ducker, K., Brade, C., Netto, K., and Tye, M. Examining the validity, reliability and practicality of methods to monitor the hydration status of combat sport athletes: A review of the literature. A report for the Combat Sports Commission of Western Australia. Curtin University Perth 2018

**Authority:** s.33A, s.49A *Combat Sports Act 1987*

## Strategy

### Pre-contest medical assessment

- The pre-contest medical assessment form will be amended to include a specific dehydration assessment.
- Currently, the form requires the medical practitioner to declare that, in their opinion, the contestant is/is not fit to participate in the proposed combat sport contest.
- However, the form itself does not contain any specific assessment of signs of dehydration.
- Amending the form to include a specific dehydration assessment will require the medical practitioners to focus greater attention to the dehydration status of contestants.
- If the medical practitioner assesses the contestant to be exhibiting signs of significant dehydration, then they will be required to validate the assessment with a USG test.
- The pre-contest medical form will include a section for a USG test to be performed by a medical practitioner.
- Testing will involve relevant contestants submitting a urine sample to be measured using a handheld pen refractometer device which measures USG.

## Process

- Contestants that are identified as displaying signs of significant dehydration by the medical practitioner will be required to provide a urine sample in a cup/container to be tested by the medical practitioner.
- Contestants will be required to sign a declaration as follows:
  - I certify that the urine specimen I have provided is mine and that I have not adulterated it in any manner.
  - Any person providing false or misleading information will be subject to a maximum fine of \$12,000 as per s.53 of the *Combat Sports Act 1987*.
- The Commission will provide guidance to medical practitioners that a USG level of greater than 1.025 indicates a possible dehydrated state which could affect performance.
- However, the determination of fitness to compete will ultimately fall to the medical practitioner.

## Why use 1.025 as the urine specific gravity threshold?

- Moderate to severe dehydration is commonly accepted to occur when USG readings are between 1.020 and 1.030.
- 1.025 is also used by the following authorities as the dehydration threshold:
  - University Interscholastic League (UIL) - Texas, USA
  - National Federation of State High School Associations (NFHS) USA

## Failed Tests

- If a contestant is not fit to compete on the basis of dehydration, then the following process will occur:
  - First occurrence
    - Do not compete.
    - Letter from the Commission outlining the dangers of rapid weight loss by dehydration and the implications of future occurrences.
  - Second occurrence
    - Do not compete.
    - Commission hearing – subject to disciplinary powers



# Weight Assessment – Weigh-Ins

## Overview

The existing weigh-in rules do not discourage contestants from gaining as much weight as possible between the weigh-in and contest (approximately 24 hours) which can be in excess of 5% body weight for many contestants, based on secondary weigh-in data captured by the Commission throughout 2017. The new weigh-in process will address this issue and will create a more equitable and safe environment for combat sports in Western Australia.

**Authority:** s.45, s.48 and s.62A *Combat Sports Act 1987*

## Strategy

### Single Weigh-in Attempt

Rules will be amended so that contestants will no longer have multiple attempts to make weight within the two-hour window of the weigh-in. Contestants will only have one attempt to make the relevant weight. The current process incentivises rapid weight loss by dehydration by compelling contestants that weigh over the agreed maximum weight to rapidly lose additional weight through dehydration prior to weighing in again within the two-hour time limit. Contestants will weigh-in wearing minimal clothes which is consistent with current rules.

### Weight Classes Only

The Commission will no longer approve catch weights (agreed weights)<sup>25</sup> and will only allow contestants to compete within the approved relevant weight class. Contestants will be able to compete at any weight within that relevant weight class.

Weight classes are imposed for the health and safety of contestants to ensure that similarly weighted contestants are matched together. Catch (agreed) weights are a way to circumvent the weight classes that are set out in the *Combat Sports Regulations 2004* or the approved rules of sanctioning bodies.

Contestants will be encouraged through education to aim for the middle of the relevant weight class rather than the upper limit which will increase the risk of weighing outside the weight class.

Rules and permit conditions will be amended so that contestants weighing over the maximum weight or under the minimum weight of the relevant weight class will not be permitted to compete. If contestants are weighing outside the range of a weight class, then this is a strong indication that they are attempting to compete in a weight class that is not appropriate for their body type. With the enforcement of strict weight classes, there will be an incentive for contestants to compete closer to their normal fighting weight.

If approved sanctioning body weight classes vary from Commission rules, then the sanctioning body weight classes will apply.

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<sup>25</sup> A catch weight is defined as a weight limit for a contest that is not aligned with any weight class.

### Secondary Weigh-in (Data Collection)

The Commission will require all contestants to undertake a mandatory secondary weigh-in at the contest for the purposes of collecting data by which the Commission can evaluate the success of the Strategy in curbing the dangerous practice of weight cutting.

While the secondary (contest) weight will be used for data collection purposes, the Commission will enforce its health and safety oversight in extreme cases where excessive weight gain causes a mismatch between opponents.

The Commission may escalate the Strategy via a strictly enforced secondary weigh-in or move to a same day weigh-in if the dangerous practice of weight cutting continues after the introduction of the Strategy.

### Other Changes

- Pre-testing of contestant weights on the official scales at the weigh-in will not be permitted.
- Commission scales are no longer to be provided to registrants (promoters/trainers etc.) ahead of the event. Testing of scales in the Commission staff offices will continue to be permitted.

## **Weight Assessment – Certificate of Fitness**

### **Overview**

The Certificate of Fitness will be amended to include some questions about proposed contest weight class, past contest weight class and walking weight and a question for the medical practitioner to consider whether the proposed weight class is reasonably achievable for the contestant based on all available information.

**Authority:** s.16 *Combat Sports Act 1987*, r.8A *Combat Sports Regulations 2004*

## Regulation

**Authority:** s.10(1)(b), s.10(1)(d), s.23 *Combat Sports Act 1987*

The *Combat Sports Act 1987* provides for the Commission to:

- (b) formulate...codes of conduct...for the purpose of maintaining proper standards in combat sports;
- (d) devise and approve...guidelines for the preparation or training of persons participating in or proposing to participate in contests.

### Strategy

The Commission will include the following wording in its Code of Conduct to prohibit rapid weight loss by dehydration:

*There should be no attempt to 'make weight' by any artificial means to dehydrate, as such means increase the risk that contestants may be seriously or even fatally injured during contests.*

*In the interests of contestant safety, the Commission prohibits the use of heat suits, saunas and any other device which purposely increases body temperature and/or dehydrates the contestant.*

*The Commission also prohibits the use of intravenous therapies which are used for aiding rehydration from excessive and deliberate dehydration.*

*Any promoter, trainer, or other person registered with the Commission found to be encouraging the use of such methods will be sanctioned by the Commission. Any contestant known to be using these methods will not be allowed to compete.*

Inserting the above wording into the Code of Conduct will allow the Commission to impose disciplinary procedures under section 23 (contestants) or 33A (industry participants) of the *Combat Sports Act 1987* such as suspension or cancellation of registration.

# Education

## Overview

The Strategy includes a strong focus on industry education as a means of improving safety and shifting the culture of combat sports away from the dangerous practice of rapid weight loss by dehydration.

## Mandatory Online Education Assessment

**Authority:** s.17 *Combat Sports Act 1987*

## Strategy

Under the Strategy, all people that register with the Commission will be required to undergo an online education assessment which will ensure that registrants attain a minimum level of knowledge prior to competing or participating in combat sports in Western Australia. The assessment will apply to all classes of registration and the content will be modified according to the relevant class (contestant, trainer, official etc).

The assessment content will be broader than weight cutting and may include:

- contestant preparation
- concussion
- drug testing
- Code of Conduct
- medical expiry and requirements
- blood serology testing, expiry and requirements
- penalties for breaches
- rules and regulations

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## Introduction Package

**Authority:** s.10 *Combat Sports Act 1987*

## Strategy

Once registered with the Commission, a registrant will be issued with introduction materials in the form of a brochure containing relevant information and links to other resources. This may also include information covered in the mandatory online assessment.

## Industry Education Package

**Authority:** s.10 *Combat Sports Act 1987*

### Strategy

The Commission will distribute a brochure to the industry focused around weight cutting and the final Strategy.

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## Contestant Record Book

**Authority:** s.35 *Combat Sports Act 1987*

### Strategy

The Commission will include information about the dangers of weight cutting in the Contestant Record Book in addition to any other relevant health and safety information.

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## Guidelines

**Authority:** s.10 *Combat Sports Act 1987*

### Strategy

Guidelines will be updated to reflect any new findings, outcomes and advice regarding the Strategy.

## Interstate and International Contestants

Pursuant to Regulation 6A of the *Combat Sports Regulations 2004*, a person who is registered or licensed under a law of a place outside of the State, the purpose of which substantially corresponds with the purpose of the Act, as a contestant, is to be taken to be registered under the *Combat Sports Act 1987* as a contestant.

As such, interstate and international contestants that are not registered in Western Australia are not subject to all components of the Strategy, such as the mandatory online education assessment.

However, all contestants including interstate and international contestants will be subject to the following components of the Strategy which will ensure that there is equality and safety for all contestants regardless of origin:

- Dehydration Assessment
  - Pre-contest clinical assessment to identify significant dehydration
  - Urine specific gravity (USG) test to support the clinical assessment if determined
- Weight Assessment
  - Single weigh-in attempt
  - Weight classes only: Removal of catch (agreed) weights
  - Contestants to weigh within weight class range
  - Secondary weigh-in (data collection)

## SECTION 6: Strategy Omissions

The consultation group identified several measures to address weight cutting, however some were excluded from the Strategy for various reasons as set out below.

### Body Scanning

There are two common methods of body composition analysis which are used to measure bone, fat and muscle mass in the human body; bioelectrical impedance analysis (BIA) and dual energy x-ray absorptiometry (DEXA) scans.

DEXA scans are considered the gold standard in body composition analysis however accessing this technology can be difficult, expensive and the scans emit mild radiation which means that the service isn't generally available for people under 18 years of age.

BIA is accessible and relatively cheap however studies have found varying degrees of accuracy for individuals, particularly for females.

Neither of these methods are suitable for incorporation into the Strategy at an overarching level, however either method may prove an effective tool for contestants and trainers in gaining valuable information about body composition to inform safe weight loss and overall body composition.

### Weight Monitoring and Analysis

Weight will inevitably fluctuate due to changes in diet, training intensity and during preparation for a contest, even excluding the body mass manipulation that occurs from weight cutting.

Ultimately, there is no single 'ideal' weight, so the Strategy removes any such ambiguity by not including weight monitoring and analysis.

The specific weight-based measures that were considered as part of the Strategy include:

- weekly reporting of weight data or recording weekly weights in contestant record books
- imposing minimum weight classes for contestants
- imposing higher minimum weight classes for contestants that miss weight

The difficulty with many weight assessments is determining a safe weight and/or safe weight loss as this may vary for each individual. Some of the combat sports authorities such as ONE Championship and the NCAA place a strong emphasis on weight monitoring and assessment, however these organisations have a greater role in monitoring the weights of contestants during seasons and outside of competition.

The Commission does not have the authority under the *Combat Sports Act 1987* to monitor contestants out of the weigh-in and contest. Any data capture on weights outside of weigh-ins would be provided on a voluntary basis and as such would be incomplete and unreliable.

One other difficulty with weight monitoring and assessment is that it would only apply to a certain portion of contestants. International and interstate contestants that are competing in Western Australia are subject to different requirements under the *Combat Sports Act 1987* and as such would

not be subject to all of the health and safety requirements that may be imposed on local contestants, which may result in mismatched contests.

However, the Strategy does not ignore the importance of weight. One of the main components of the Strategy is the strict enforcement of weight classes. The intent of this measure is for contestants to compete closer to their natural fighting weight with the risk that weighing outside the weight class range would result in the contestant being ineligible to compete. There is an inherent penalty in this method that means that there is no need to move contestants up weight classes as they will trend towards these naturally.

In addition, one other aspect to the Strategy is the inclusion of an amendment to the Certificate of Fitness whereby the medical practitioner is required to specify whether the intended weight loss is safe. The form will include fields to specify walking weight, past contest weight/class and proposed contest weight/class.

### **Gym Accreditation**

Consideration was given to the establishment of a system of gym accreditation or a voluntary best practice acknowledgement by the Commission for gyms that were meeting certain conditions associated with best practice health and safety standards.

It was determined that this measure extended beyond the scope of the Commission's power under the *Combat Sports Act 1987* and as such was excluded from the Strategy.

### **Secondary Weigh-in**

The Commission has resolved to enforce a secondary weigh-in for the purposes of data collection. The Commission will use the data to evaluate the success of the Strategy in curbing the dangerous practice of weight cutting.

While the secondary (contest) weight will be used for data purposes, the Commission will enforce its health and safety oversight in extreme cases where excessive weight gain causes a mismatch between opponents.

The Commission may escalate the Strategy via a strictly enforced secondary weigh-in or move to a same day weigh-in if the dangerous practice of weight cutting continues after the introduction of the Strategy.

### **Same Day Weigh-in**

Research has suggested that the amount of body mass that can be lost prior to a weigh-in and subsequently regained prior to the contest is reduced by same day weigh-ins.

Same day weigh-ins were considered for inclusion in the Strategy, however the Commission ultimately preferred the 24-hour weigh-in as part of the initial Strategy.

As mentioned above, same day weigh-ins remain a live option for the Commission and may be implemented at a later date as an alternative to the secondary weigh-in.





Government of **Western Australia**  
Combat Sports Commission



For more information contact the Commission on:  
Email: [combatsport@dlgsc.wa.gov.au](mailto:combatsport@dlgsc.wa.gov.au)  
or visit: [www.dsr.wa.gov.au/combat-sports-commission](http://www.dsr.wa.gov.au/combat-sports-commission)