The use of Swiss Balls in athletic training – an effective combination of load and fun
by Klaus Bartonietz and Debbie Strange

Swiss or Pezzi Balls are an effective training tool for increasing strength, improving joint and body stability and increasing joint flexibility. They are widely used in physiotherapeutic treatments and can be a part of each programme in general training in athletics. Exercises with the Swiss Balls can be tailored to the specific demands of different competition movements. Top athletes, such as discus World champion Beatrice Faumuina and javelin thrower Gavin Lovegrove (both New Zealand) and Boris Henry (Germany), regularly use Swiss Balls in their training programmes. Swiss Ball exercises can be executed at an advanced level in combination with exercises with rubber bands, or to complement a training programme using weight machines and free weights. The exercises presented in this article are for beginners as well as advanced athletes.

1 Introduction

General athletic skills and abilities such as core stabilization and body balance are important preconditions for high performance in training and competition. To reach and conserve a stable body position under the dynamic external conditions of training and competition requires a high skilled nervous system to process the neuromuscular feedback and to react to the very fast changing external conditions. Good body alignment is essential in all athletic activities, for better performance and recovery. Stable joints are a precondition for efficient work of the main muscle groups, also called "prime movers". Active muscle work of the stabilizers can increase the stiffness of, for example, the leg and the trunk by several times. This is of importance for absorbing impact and preventing injury in the jumps, throws and also the sprints. At the same time, many athletes suffer from different problems around the main joints (see Figure 1), often caused by muscular imbalance and undeveloped stabilizing functions.

Corresponding with our training philosophy, that only the healthy athlete can perform well, all efforts have to be made to minimize injury risk. So coach and athlete must consider both exercise effectiveness and safety. Swiss Balls are an effective training tool for increasing strength, improving joint and body stability and increasing joint flexibility. The unstable ball activates muscles to stabilise and balance the body. The use of this implement demands creativity from the athlete and coach.

Swiss or Pezzi Balls (other names: gymnastic ball, fitball) are widely used in physiotherapeutic treatments (e.g. KONERDING/SEDELMAIER 1994, BALK 1996, KEMPF 1997, LAURITIS 1997, MEIER 1997) and can be a part of each programme in general training in athletics (FOXHOVEN/PLATE 1996). Exercises with the ball can also be tailored to the specific demands of the different competition movements. Top athletes, such as discus World champion Beatrice Faumuina and javelin thrower Gavin Lovegrove (both New Zealand) and Boris Henry (Germany), regularly use Swiss Balls in their training programmes.

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Swiss Ball exercises can be executed at an advanced level in combination with exercises with rubber bands (so-called "stretchies", e.g. Thera or Deuser bands), or to complement a training programme using weight machines and free weights (dumb-bells, barbell).

Balls are manufactured to a very high quality and are available around the world in shops for sporting and physiotherapeutic goods. Their size extends from 0.45m up to 1.2m in diameter (differences of 10cm). Anti burst balls made from Krylon (CHECK 1997) will not rip in case of piercing. "Normal" balls can split wide open, which can be unsafe. Balls of an oval shape ("egg balls") serve a similar purpose, especially useful for beginners because they roll only in a forward-backward direction.

2 Some preconditions

Training measures in general require a knowledge of the specific neuromuscular and biomechanical demands of the competition movements (e.g. the function of the pelvic stabilisers in sprinting, jumping and throwing). It is recommended that a musculoskeletal assessment be made, before starting a targeted general strengthening programme. Together with the balance of strength (e.g. quadriceps-hamstrings ratio, left-right balance), the flexibility around the main joints has to be checked. Weak abdominal muscles in relationship to the back muscles are often found (NORRIS 1994). As accurate diagnosis and correct therapeutic treatment need a specialist (physician or physiotherapist), they cannot be the focus of this study.

As in every training session, the athlete has to be well warmed up (15-20min), with a good cool down after the training session. The ball can be used also during the warm up (with the ball: balancing/juggle on the head and with the feet, squatting, arm swings, sitting with pelvis forward-backward movements, rollings, shoulder shrugs, dynamic stretching exercises, see Figures 2-6). The athlete will gradually become confident with the new implement, checking its ability to take advantage of the elasticity. It is helpful to exercise in front of a mirror to get a visual feedback about the body position.

For most of the exercises, the right ball size is being used if, in a sitting position, the thighs are raised slightly above the horizontal (the ball has to be pumped up correctly - it should always feel firm but not tight, see Figure 2). The minimum sizes are, e.g. for a 1.65m tall athlete, 65cm in ball diameter (correct ball diameter = body height in centimetres minus 100).

The exercises shown must be part of the entire training programme for a period of at least several weeks, as designed by the coach and ideally under the supervision of a physiotherapist (e.g. to check the correct position of the vertebrae).

The goal of using the Swiss Ball is to decrease muscular imbalance, to promote neuromuscular and proprioceptive development, and to develop muscular control, especially of lumbopelvic movements.
Figure 2: Pelvis tilt and rolling (side to side, forward and back)
Advanced level: place supporting foot on a small ball.

Lift and leg extension (hold 5 seconds)

Figure 3: Basic stretch (back arch) – additional load given by a partner
Adapt positions for lateral raises (butterflies), dumbell press, medicine ball throws.

It is especially important, for safety reasons, for the beginner to have the assistance of a partner. Some exercises have to be executed with a training partner or with the coach. The training principle “specificity” guides the selection of exercises. The athletes, therefore, need to judge their skill level – beginner, intermediate and advanced.

3 The exercises

Imaginative names have been given by different experts to the main exercises, such as “figurehead” (Figure 6), “windscreen wipers” (Figure 9), “goldfish” (Figure 11) and “sea urchin” (Figure 12), based on the characteristic images of the exercises. Own names, given by the athletes, will help to find a close personal relationship with the exercises.

Most of the exercises are shown in the side view. All the exercises act on the entire body rather than on single muscle groups. Nevertheless, with respect to the targeted main training effect in this study, they are classified as arm/shoulder, trunk and hip/leg complexes.

When training with the ball, the following rules should apply:
• Use 3-6 series of 5-12 repetitions per exercise.
• Select a group of about 5 exercises, from simple to more complex exercises.
• Systematically increase the duration, intensity and frequency of the exercises.

Figure 4: Upper body stretch (rolling the ball)

Figure 5: Knee balance
Advanced level:
• free kneeling on ball (thigh stabilisation),
• standing balance on ball (with a partner).

• Include both sides of the body in the exercise programme.
• At least 3 ball sessions should be realised per week to reach the desired training effect (in combination with other general training routines).
Figure 6: "Figurehead"
Advanced level: balance on the ball on stomach, arms and feet off the ground ("scale")

Figure 7: Hip lifts (trunk and leg stabilisation)
Advanced level: balancing on one heel, flexing knee and hip

- The exercises must be executed in a controlled manner, avoiding hasty, jerky movements.
- Breathe in during the relaxing part of the exercise – breathe out during the loading part. Never compress the air in the lungs during the isometric portion of some exercises.
- Exercises with the ball are normally pain-free. In case of any pain during the exercise, consult your physician.

For some exercises a bigger ball is more effective (e.g. for stretching, rolling over the ball, see Figures 3, 11). For other exercises, a smaller ball is not a handicap (e.g. push-ups on the ball, see Figure 10).

The following measures can be used to increase the training load, and thus also the training effect:
- the use of balls with different diameters,
- variations in the width of the leg base (sitting on or rolling over the ball),
- additional weights such as discs, dumb-bells or a bar held in the hands, disc on the back, additional rubber bands on the legs or arms (see BALK 1996, KEMP 1997),
- using a partner to give resistance to different areas (e.g. on knees or shoulders), or to upset the balance,
- feet on the wall (see Figure 14),

Figure 8: Curles and crunches
Feet apart or crossed, short trunk amplitude

Figure 9: "Windscreen wipers" (lateral, left picture) and leg lifts (over head, left), lateral leg lifts (right picture)
• simultaneous use of 2 or 3 balls (e.g. exercises presented in Figure 10),
• variation of the air pressure inside the ball.

Avoid fixed feet: if the feet are fixed (e.g. by the coach or under a bench), the athlete can pull into the fixed placement with the help of the dorsiflexors of the ankle joint. In case of weak abdominals, the athlete can sit up using only activity of the iliopsoas (NORRIS 1994), which is not the training target.

The exercises presented below are basic and easy for beginners to execute (Figures 2-4, 6-9, 12-13, 15-16). The exercises presented in Figures 5, 10, 11, 14 are to be used by advanced athletes.

To get into the starting position, see figure 11, first 3 pictures.

Position 1
alternating arm and leg raises (up and side)

Position 2
diagonal arm and leg raises with additional load

Position 3
advanced level: push ups, arm and leg raises

Figure 10: Exercises for leg, trunk and arm/shoulder stabilisation and strengthening (1 or 2 Swiss Balls)
Figure 11: Roll out and back
Advanced level: roll out and back using single leg on ball

Figure 12: Back leg extension

Figure 13: Arm and leg raises
(up front, to side)

Exercises for the abdominal muscles can be executed on pumped up car tyre inner tubes.

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Figure 15: Rolling the ball up and down against a wall

Figure 16: Pushing against partner
- variations in leg base (parallel, stride),
- balancing and stretching

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