International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

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ARTICLE TITLE	COLOSTRUM SUPPLEMENTATION IN ATHLETES: EFFECTS ON PERFORMANCE, IMMUNITY, AND RECOVERY
ARTICLE INFO	Lidia Mądrzak, Bartłomiej Roszkowski, Marta Korchowiec, Wiktor Chrzanowski, Katarzyna Krzyżanowska, Łukasz Bialic, Władysław Hryniuk, Julia Kwiecińska, Jacek Sitkiewicz, Alicja Toczyłowska, Mateusz Muras. (2025) Colostrum Supplementation in Athletes: Effects on Performance, Immunity, and Recovery. *International Journal of Innovative Technologies in Social Science*. 3(47). doi: 10.31435/ijitss.3(47).2025.3517
DOI	https://doi.org/10.31435/ijitss.3(47).2025.3517
RECEIVED	15 June 2025
ACCEPTED	04 August 2025
PUBLISHED	06 August 2025
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COLOSTRUM SUPPLEMENTATION IN ATHLETES: EFFECTS ON PERFORMANCE, IMMUNITY, AND RECOVERY

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ABSTRACT

Objective: Bovine colostrum (BC) is the first milk produced by cows in the initial days after calving. It is a nutrient-rich fluid formulated to support neonatal growth and immunity. Its composition includes immunoglobulins (mainly IgG), growth factors, antimicrobial peptides (e.g., lactoferrin, lysozyme, lactoperoxidase), cytokines, oligosaccharides, and essential vitamins, minerals, and macronutrients. This review aims to evaluate the effectiveness of bovine colostrum supplementation in athletes, particularly in the context of performance, immune function, and gut health.
Methods: All data were collected from publicly available sources. This article's databases were accessed via PubMed, Scopus, and Web of Science.
Key findings: In recent decades, BC has gained interest in sports nutrition due to its potential benefits beyond early development. In athletes, colostrum may help support post-exercise recovery, enhance immune function under physical stress, and protect against exercise-induced intestinal permeability. Evidence also suggests it may reduce the incidence of upper respiratory tract infections and inflammation, while helping maintain gut barrier integrity. These mechanisms may indirectly improve athletic performance and reduce training disruptions.
Conclusion: Bovine colostrum appears to support gut integrity, immune resilience, and recovery in athletes. Its potential impact on performance is likely secondary to these health benefits. However, further high-quality studies are needed to confirm efficacy and define optimal dosing protocols in sports nutrition.

KEYWORDS

Colostrum, Sport, Athletes, Supplementation, Recovery, Performance

CITATION

Lidia Mądrzak, Bartłomiej Roszkowski, Marta Korchowiec, Wiktor Chrzanowski, Katarzyna Krzyżanowska, Łukasz Bialic, Władysław Hryniuk, Julia Kwiecińska, Jacek Sitkiewicz, Alicja Toczyłowska, Mateusz Muras. (2025) Colostrum Supplementation in Athletes: Effects on Performance, Immunity, and Recovery. *International Journal of Innovative Technologies in Social Science*. 3(47). doi: 10.31435/ijitss.3(47).2025.3517

Introduction.

Athletes, particularly those engaged in high-volume or high-intensity training, are at increased risk of immune suppression, which may compromise both health and performance. This immunosuppressive state is often exacerbated by cumulative training load, psychological stress, disrupted sleep, and exposure to extreme environmental conditions [1, 2]. Collectively, these factors can heighten susceptibility to infections, especially of the upper respiratory tract (URTIs). Endurance athletes such as swimmers, triathletes, and cyclists appear particularly vulnerable, likely due to the prolonged and repetitive nature of their training [3].

In contrast, moderate and recreational physical activity has been consistently shown to enhance immune function and reduce infection risk. However, when training intensity or duration increases beyond a certain threshold, immune competence may temporarily decline, especially if adequate recovery is not achieved between sessions [4]. This phenomenon, often referred to as exercise-induced immunodepression, is characterized by transient alterations in both innate and adaptive immune responses.

The immune system, responsible for defending the host against pathogens and maintaining internal balance, relies on a delicate interplay between non-specific innate mechanisms and highly specialized adaptive responses. Repeated bouts of strenuous exercise have been shown to temporarily reduce immune surveillance, creating an “open window” during which the likelihood of infection rises [3, 5]. For elite athletes, frequent travel, contact with large crowds, and suboptimal hygiene at training camps or competitions further amplify their exposure to infectious agents [3].

Given that even mild infections can disrupt training cycles or impair competition readiness, identifying effective strategies to support immune function has become an area of considerable interest. Nutritional interventions, including targeted supplementation, are among the most promising approaches under investigation [4, 6, 7].

Recent studies have highlighted the potential of bovine colostrum supplementation in supporting immune health across various populations, including children, adolescents, and physically active individuals. Its rich composition—containing immunoglobulins, growth factors, and antimicrobial peptides—suggests a multifaceted role in enhancing immune, gastrointestinal, and endocrine functions. Furthermore, bovine colostrum has been investigated for its possible ergogenic properties, offering a potential adjunctive strategy to support performance and recovery in athletes [8-10].

Objective

The aim of this review is to evaluate the effects of bovine colostrum supplementation in athletes, with particular emphasis on its potential roles in enhancing performance, supporting recovery, modulating immune function, and promoting gut health.

Methodology

For this narrative review all data were collected from publicly available sources. Three bibliographic databases: PubMed, Scopus and Web of Science were screened in May 2025. The combination for records extraction was "colostrum" and "sport". Only studies in English were retrieved. There were no time restrictions on the publication dates of research papers. Conference abstracts and book chapters were excluded. The reference lists of identified studies were searched for additional articles. Duplicate studies were removed using Rayyan - a web and mobile app for systematic reviews [11]. The studies were screened based on the title and abstract and then selected for full -text review by the first author (LM). Decisions were also recorded in Rayyan. Relevant data from included articles were collected by two researchers (LM, BR). One meeting of the whole team was organized to review included studies and establish the subsections for this article.

Results

Eventually all studies were sorted into six themes: Composition of Colostrum, Performance, Recovery, Immunity, Gut Health, Controversies.

Composition of Colostrum

Compared to mature bovine milk, colostrum exhibits a substantially richer composition in both macronutrients and bioactive molecules. On average, bovine colostrum contains approximately 14.9% protein, 6.7% fat, and 2.5% lactose, making it significantly more protein-dense than regular cow's milk (approximately 13.0% vs. 3.3%). It also provides an array of micronutrients, including fat-soluble vitamins such as vitamin A (retinol) and vitamin E (tocopherol), alongside essential minerals like calcium, phosphorus, and magnesium [12, 13].

In addition to its macronutrient and micronutrient content, bovine colostrum is particularly notable for its richness in immune-modulating compounds. It contains high concentrations of immunoglobulins—primarily IgG1, along with IgG2, IgA, and IgM—which provide passive immunity and protect the neonate against environmental pathogens. Furthermore, it is a valuable source of lactoferrin, lysozyme, and a variety of cytokines and growth factors that contribute to the maturation of the immune system and gastrointestinal tract. These bioactive components are largely responsible for colostrum's potential therapeutic applications beyond early postnatal life, including its use in promoting immune resilience as well as potential human health applications [12, 14-17].

The composition of colostrum can vary depending on factors such as breed, parity and environmental conditions. Management practices, including feeding and storage, also have a significant impact on colostrum quality [18]. To maintain the stability and bioactivity of bovine colostrum, various preservation techniques such as pasteurization, refrigeration, and freeze-drying are employed. These methods help protect the functional integrity of immunoglobulins and other bioactive components, thereby enabling its use beyond the immediate postpartum period when fresh colostrum is unavailable [19, 20].

Bovine colostrum is being studied as a human nutritional supplement, particularly in pediatric nutrition. It has been shown to have the potential to support gut health, improve immune function and reduce the risk of infection and gastrointestinal disorders in infants and children. Research suggests that bovine colostrum may offer therapeutic benefits for a range of health conditions, including inflammatory bowel disease, cardiovascular disease and immune-related disorders. These effects are attributed to its bioactive components, such as lactoferrin and immunoglobulins. However, the variability of colostrum composition poses a challenge for its use in human nutrition. Standardization of processing methods and a better understanding of how different preservation techniques affect its efficacy are essential to optimize its health benefits [17, 18, 20].

Performance

The impact of bovine colostrum supplementation on athletic performance has been explored in a range of sports disciplines, with mixed but promising outcomes, particularly in anaerobic and power-based activities [21].

In a randomized, controlled trial by Hofman Z et al., involving 35 elite male and female field hockey players from the Dutch national league, participants received either bovine colostrum or whey protein supplementation for a period of eight weeks [22]. The training program was standardized across the groups and comprised four weekly sessions integrating high-intensity interval training, power exercises, and tactical drills. Exercise performance was evaluated using four standard tests: sprint, vertical jump, shuttle run, and suicide test. It was observed that those athletes who received the colostrum supplement exhibited a significantly greater improvement in their sprint performance in comparison to the whey protein group. Additionally, a tendency towards enhanced vertical jump performance in the colostrum group was observed, although this did not attain statistical significance, likely attributable to inadequate sample size, as the magnitude of the observed difference mirrored those of statistically significant findings from previous research. No substantial differences were observed between the groups in shuttle run or suicide test outcomes. Importantly, these performance changes could not be explained by differences in training intensity, lean body mass, or adherence, supporting the hypothesis of an independent effect of colostrum on anaerobic power and explosive strength.

In a six-month randomized controlled trial by Cieslicka M et al., the impact of bovine colostrum supplementation on physical performance and immune function was investigated in football players [23]. Participants were randomly allocated into either a colostrum or placebo group using computer-generated codes. Despite the open-label nature of the study, the assessors of outcomes were kept unaware of the group assignments. Physical performance was evaluated at baseline, three months, and six months using the multistage 20-meter shuttle run (Beep Test). Across all time points, no statistically significant differences in exercise capacity were observed between the colostrum and placebo groups. Nevertheless, the study reported a significant improvement in immune function in the colostrum group.

A total of 28 moderately trained male athletes (17 triathletes and 11 swimmers) completed the full study protocol in a study designed by Durkalec-Michalski K et al [24]. Each athlete was given a daily dose of 25 g of either bovine colostrum or placebo over a 12-week period. The study revealed that neither bovine colostrum nor placebo supplementation resulted in statistically significant changes in total or partial times during the swimming-specific performance (SSP) test. However, a trend towards enhanced performance was observed following colostrum supplementation, with an average decrease of approximately 3.04 seconds in total test time compared to the baseline. In contrast, performance exhibited a slight decline after placebo, with an average increase of ~7.13 seconds relative to pre-supplementation values. Supplementation did not have a significant impact on maximal heart rate (HRMAX) or mean heart rate (HRMEAN) during the SSP test. However, a significant reduction in HRMEAN was observed after placebo supplementation, with the average heart rate being significantly lower compared to the pre-colostrum time point ($p = 0.006$), suggesting a possible variation in cardiovascular response unrelated to the direct effects of supplementation. While segmental performance remained relatively stable, minor variations were observed, which may reflect a practice or familiarization effect. No consistent improvements were seen across other distances or in total test time across the different visits. In summary, twelve weeks of colostrum supplementation did not produce a statistically significant enhancement in swimming-specific performance in moderately trained athletes. However, the modest reduction in test time post-colostrum, in contrast to the increase following placebo may indicate a subtle, non-significant performance benefit. These findings underscore the necessity of accounting for practice effects in crossover training studies and suggest that any potential ergogenic effect of bovine colostrum on performance may be limited or indirect.

The observed differential effects of colostrum supplementation on various exercise modalities may be attributable to the energy systems predominantly engaged during each activity. Notably, improvements were more pronounced in performance measures reliant on the ATP–creatine phosphate (ATP-CP) system, such as sprinting and vertical jumping, while no significant effects were observed in activities requiring sustained aerobic or anaerobic glycolytic metabolism, such as shuttle or suicide runs. Although the exact mechanism of colostrum's ergogenic action remains unclear, it is plausible that supplementation supports or enhances physiological and metabolic pathways subjected to intense training stimuli. The increased average power output observed during sprint tests suggests a potential augmentation in the availability or turnover of high-energy phosphates, namely ATP and creatine phosphate. Thus, it can be hypothesized that colostrum may

facilitate more efficient energy production in short-duration, high-intensity efforts through modulation of ATP-CP dynamics [22].

Additionally, findings by Antonio et al. demonstrated that daily supplementation with 20 g of bovine colostrum led to a significant increase in bone-free lean body mass (mean gain of 1.49 kg) in physically active men and women, whereas no such improvement was observed in the whey protein control group [25]. This suggests that bovine colostrum may positively influence muscle mass development, potentially contributing to performance enhancements observed in short, high-intensity activities.

Moreover, heart rate, a key physiological marker, reflects the cardiovascular system's ability to supply oxygen to working muscles during prolonged exercise and is commonly used to assess endurance performance. Lower resting HR and more rapid post-exercise recovery are indicative of enhanced cardiovascular fitness. HR monitoring also allows athletes to modulate training intensity to optimize endurance adaptations [26]. In one of the previously described studies, Shing et al. observed that following a high-intensity training (HIT) program, bovine colostrum supplementation preserved submaximal HR responses during exercise [27]. Specifically, in comparison to the placebo group, the colostrum group maintained heart rate during a 40-minute time trial (TT40 HR) by 2.5 ± 3.7%, suggesting a potential benefit in sustaining exercise intensity and attenuating cardiovascular strain during intense training periods.

Recovery

Recovery from exercise-induced muscle damage is a critical aspect of athletic performance and training adaptation. A double-blind, randomized, placebo-controlled trial conducted by Kotsis et al. investigated the effects of bovine colostrum supplementation on post-exercise recovery [28]. Participants completed an initial exercise protocol (LIST 1), after which markers of muscle damage and performance were assessed for 72 hours. After six weeks of supplementation with either bovine colostrum or whey protein, participants repeated the same protocol (LIST 2). Notably, only the bovine colostrum group demonstrated a significantly faster recovery of squat jump (SQJ) performance 48 hours after LIST 2, as indicated by a significant trial × time interaction ($p = 0.001$) and a favorable intervention × time interaction when compared to the whey protein group. These findings suggest that bovine colostrum may support enhanced neuromuscular recovery following strenuous exercise, offering potential benefits for athletic performance and training continuity. In addition to performance measures, Kotis et al. also assessed biochemical markers associated with muscle damage. When comparing responses to the simulated soccer protocol (LIST), which is designed to replicate the physical demands of a typical match in a standardized environment, a non-significant trend toward reduced creatine kinase (CK) activity was observed in the bovine colostrum group following the second LIST session. This reduction became statistically significant 24 hours post-exercise, suggesting a potential attenuation of muscle damage. Furthermore, when comparing the incremental area under the curve (iAUC) between groups post-supplementation, the bovine colostrum group showed a trend toward lower iAUC values than the whey protein group ($p = 0.081$), indicating a potentially more favorable biochemical recovery profile. Perceived muscle soreness (PMS) was assessed using a visual analog scale (VAS) to evaluate delayed-onset muscle soreness across five muscle groups at multiple time points. No significant differences in soreness were observed between the pre- and post-supplementation LIST sessions in either the bovine colostrum or whey protein group. The only exception was a reduction in VAS scores for the knee flexors following the post-supplementation LIST in the whey protein group. These findings suggest that, while bovine colostrum may influence biochemical markers of muscle damage, its effect on subjective muscle soreness remains inconclusive [28, 29]. Interestingly, the effects of bovine colostrum on performance recovery appear to be more pronounced in movements that are particularly sensitive to exercise-induced muscle damage (EIMD). In the study by Kotis et al, squat jump performance, which is highly susceptible to inflammatory responses following eccentric exercise, showed greater recovery in the colostrum-supplemented group. This is consistent with the findings of Byrne et al, who observed that the SQJ was more affected by eccentric protocols than the countermovement jump (CMJ), probably due to the lack of compensatory mechanisms such as the stretch-shortening cycle and neuromuscular feedback. These observations suggest that the mild anti-inflammatory properties of colostrum may preferentially benefit muscle groups and performance tasks more directly affected by EIMD, highlighting its potential as a recovery-enhancing agent in athletic contexts [30].

The study conducted by Buckley et al. showed that eight weeks of supplementation with 60g/day of intact bovine colostrum powder had minimal effect on performance during an initial bout of incremental running to exhaustion [31]. However, performance was significantly improved in a subsequent exercise bout after a 20-minute recovery period. These findings suggest that colostrum supplementation may improve the

body's ability to recover between bouts of intense exercise. While the mechanism behind this improvement remains unclear, the results suggest a potential benefit for athletes involved in sports that require repeated bouts of high intensity performance. These findings reinforce the possible role of bovine colostrum in modulating post-exercise muscle damage and supporting recovery in physically active individuals.

Immunity

Bovine colostrum has emerged as a potent natural immunomodulator, with relevance to mucosal immunity. In a randomized, double-blind, placebo-controlled crossover study by Durkalec-Michalski et al. involving endurance-trained males, twelve weeks of BC supplementation (25 g/day) led to a significant increase in salivary secretory IgA (SIgA) levels following exercise and during short-term recovery [24]. SIgA, a key component of the common mucosal immune system, plays a pivotal role in defending mucosal surfaces against pathogens. Interestingly, BC did not affect systemic immunoglobulin levels (IgA, IgE, IgD, IgG, IgM), highlighting its localized mucosal action. A post-exercise reduction in hematocrit following supplementation may also suggest an anti-inflammatory or hemodynamic effect. These findings underscore BC's capacity to enhance mucosal immune readiness in response to physiological stress, potentially through interactions with the gut-associated lymphoid tissue (GALT) and the broader gut-immune axis.

Extended bovine colostrum supplementation over six months has demonstrated additional immunological benefits in physically active individuals. In a double-blind, placebo-controlled crossover study done by Cieslicka et al. involving young male football players, BC intake was associated with a significant increase in circulating immunoglobulin G (IgG) levels and a concurrent reduction in pro-inflammatory cytokines, particularly tumor necrosis factor alpha (TNF-α) [23]. Although no direct improvements were observed in athletic performance or parameters of iron metabolism and hormonal balance, the anti-inflammatory effect of colostrum suggests a potential for enhanced muscle recovery and reduced exercise-induced immune perturbation. By attenuating inflammation and supporting immune resilience, BC may help reduce the incidence of infections and training disruptions, especially during periods of high physical demand or seasonal vulnerability. These findings reinforce colostrum's role in modulating systemic and mucosal immunity, though individual variability in supplement composition, dosage, and training load may influence its efficacy.

Supplementation with low-dose bovine colostrum protein concentrate has been shown to positively influence immune function during periods of intense physical exertion [27]. In a randomized, placebo-controlled trial done by Shing et al. involving elite cyclists, daily intake of 10 g BC over eight weeks preserved key immune parameters, including cytotoxic/suppressor T lymphocytes (CD3+8+) and serum IgG2 levels, which typically decline after strenuous exercise. Moreover, an increase in soluble TNF receptor 1 (sTNFr1) was observed, indicating potential attenuation of pro-inflammatory TNF-α signaling. This immunoregulatory shift was associated with a trend toward fewer upper respiratory tract symptoms, suggesting improved mucosal defense during heavy training. Although systemic cytokine levels remained stable, the rise in sTNFr1 may reflect a protective mechanism that limits TNF-α–mediated inflammation and cell death. BC supplementation thus appears to support both cellular and humoral immunity, particularly during the post-exercise "open window" period when infection risk is elevated. While natural killer (NK) cell counts increased transiently after exercise, colostrum had no significant impact on their number or activity, implying a higher training load may be needed to reveal modulatory effects. Interestingly, a trend toward increased IgA secretion rate—despite unchanged salivary IgA concentrations—suggests mucosal immunity enhancement may occur via mechanisms beyond total immunoglobulin levels. The effects of colostrum are likely multifactorial, involving various bioactive components such as α1-acid glycoprotein, which modulates inflammation and binds plasma proteins [32].

However, not all studies demonstrate measurable immunological benefits. In a 24-week randomized controlled trial conducted by Skarpanska-Stejnborn et al. involving elite female basketball players, daily supplementation with 6.4 g of bovine colostrum did not significantly influence most immune markers in response to exercise, including TNF-α, IL-1α, IL-2, IL-13, IgG, white blood cells (WBC) subtypes, or insulin-like growth factors (IGF-1) levels [33]. Although a significant exercise-induced change in IL-10 was observed in both the colostrum and placebo groups ($p = 0.01$), the remaining comparisons yielded no statistical differences ($p > 0.05$). These findings suggest that in this adolescent athletic population, long-term colostrum supplementation did not elicit the anticipated immunomodulatory effects under the conditions studied. This underscores the variability of outcomes across studies and highlights the importance of considering population-specific factors, supplementation protocols, and immune endpoints when evaluating the efficacy of colostrum.

Gut health

High-performance athletes are frequently exposed to stressors such as travel, heat, and intense training, which increase their susceptibility to infections and gastrointestinal symptoms. Prolonged or strenuous exercise, particularly in hot conditions, can impair gut barrier function by disrupting tight junctions in the intestinal epithelium, leading to increased permeability and endotoxin translocation. This so-called "leaky gut" may contribute to systemic inflammation and symptoms like abdominal pain, bloating, nausea, and diarrhea—reported in up to 70% of elite athletes [2, 34-36].

Bovine colostrum has demonstrated potential in reducing exercise-induced intestinal permeability, a common issue among athletes exposed to physical and thermal stress. This effect appears linked to BC's anti-inflammatory, antioxidant, and immunomodulatory components, including growth factors and immunoglobulins. Several studies using sugar absorption tests and biomarkers such as I-FABP, zonulin, and 16S rDNA have shown that BC supplementation can improve epithelial barrier integrity and reduce systemic endotoxin translocation [37-40]. While results vary depending on dosage, duration, and individual training loads, the overall evidence suggests that BC may aid in restoring gut barrier function. However, the inclusion of BC on the prohibited list of the World Anti-Doping Agency (WADA) complicates its use in professional sports, and further research is needed to clarify optimal dosing and its impact on the gut microbiome and systemic inflammation [1].

Moreover, emerging evidence from a recent meta-analysis conducted by Hajihashemi et al. suggests that bovine colostrum may contribute to the maintenance of intestinal barrier integrity [41]. Analysis of seven effect sizes revealed that BC supplementation was associated with a statistically significant decrease in the 5-hour urinary lactulose/rhamnose ratio—a marker of intestinal permeability—indicating potential enhancement of gut barrier function. However, the strength of this association diminished in sensitivity analyses, reflecting limited robustness. No meaningful change was observed in plasma concentrations of intestinal fatty acid-binding protein (I-FABP), a biomarker of epithelial injury, across five comparisons. Furthermore, pooled data from two studies showed a slight but statistically significant reduction in the urinary lactulose/mannitol ratio following BC intake, though this effect was not sustained when individual datasets were excluded. These findings suggest that while BC may have a beneficial influence on gut permeability, the overall evidence remains inconclusive and warrants further investigation.

Bovine colostrum is a unique natural source of key growth factors, including transforming growth factor beta (TGF-β) and IGFs, which have demonstrated relevance in maintaining intestinal integrity and modulating mucosal immunity [42]. These bioactive peptides contribute to epithelial repair, stimulate cellular proliferation, and support the regeneration of damaged tissue, processes critical in both systemic injury and gastrointestinal health [43]. Animal and in vitro studies indicate that orally administered TGF-β can enhance secretory IgA production and reduce intestinal inflammation, particularly in immature or compromised gut environments [44]. Moreover, growth factors appear to exert beneficial effects on the intestinal microbiota, suggesting a broader immunomodulatory role within the gut ecosystem [45, 46].

Controversies

Bovine colostrum has been studied for its therapeutic potential in a range of clinical conditions, including chemotherapy-induced gastrointestinal toxicity and post-surgical physical impairment. Evidence suggests that colostrum may help alleviate the severity of oral mucositis in paediatric oncology patients and support improved nutritional status and physical recovery in adults recovering from femoral fractures [47, 48].

In addition, the bioactive components of bovine colostrum are being investigated for their potential role in the treatment of neurological disorders, cardiovascular disease and other chronic health conditions [17, 49].

Studies investigating the effects of colostrum supplementation often suffer from methodological limitations that limit the strength of the available evidence. There is considerable heterogeneity between studies in terms of study populations, intervention protocols and outcome measures, making direct comparisons and synthesis of results difficult. In addition, many studies rely on surrogate markers rather than clinically meaningful endpoints, and results are rarely replicated by independent research groups. Together, these limitations make it difficult to draw definitive conclusions about the efficacy and safety of colostrum in various clinical and athletic contexts [10, 47].

Although bovine colostrum is generally considered to be safe and well tolerated, there remains a lack of consensus regarding the optimal dosage, duration and long-term safety of supplementation. Inconsistencies in study design, sample size and outcome measures further highlight the need for well-controlled, large-scale clinical trials. The establishment of standardized protocols is essential to develop evidence-based guidelines and inform clinical and dietary recommendations [17, 50].

Discussion

This review aimed to assess the effects of bovine colostrum supplementation on athletic performance, post-exercise recovery, and immune function. Overall, the findings suggest that while colostrum may not consistently enhance performance across all modalities, it appears to support specific recovery markers and robustly modulate immune function, particularly in athletes exposed to high training loads or environmental stressors.

In terms of performance, results remain inconclusive. While several studies failed to demonstrate significant improvements in VO_2 max, time trial performance, or resistance training outcomes, there is emerging evidence that colostrum may enhance performance in activities reliant on the ATP-CP system. This was observed in metrics such as repeated sprint ability, agility, and short-duration power tasks. The potential mechanism underlying this effect may relate to improved recovery between bouts of high-intensity activity, rather than direct enhancement of energy system efficiency. Additionally, differences in study design, training status of participants, dosing regimens, and the nature of performance tests employed may account for the variability in results.

Colostrum's influence on recovery, although subtle, appears to be biologically plausible. While subjective muscle soreness and functional markers such as jump performance were generally unaffected, biochemical markers suggest a potential for colostrum to attenuate muscle damage and support anabolic recovery. Observed trends toward reduced creatine kinase levels and increased IGF-1 may indicate a favorable environment for muscle repair. The clinical relevance of these biochemical changes, however, remains uncertain due to small effect sizes and inter-individual variability.

The most consistent and compelling evidence supports the immunomodulatory role of bovine colostrum. Multiple studies demonstrated increased levels of salivary IgA and a reduced incidence or duration of upper respiratory tract symptoms in athletes undergoing intense training. These effects may be attributable to colostrum's high content of immunoglobulins, lactoferrin, and other bioactive peptides. Such findings are particularly relevant for endurance athletes and those training in cold environments, where immunosuppression is a common risk. Interestingly, improvements in mucosal immunity were sometimes accompanied by stabilization of systemic cytokine profiles, suggesting a broader immunological benefit.

In addition to its effects on systemic and mucosal immunity, bovine colostrum may also support gastrointestinal health, which is increasingly recognized as a critical factor in both immunity and performance. Intense exercise has been shown to compromise gut barrier function, leading to increased permeability ("leaky gut") and subsequent systemic inflammation. Colostrum's growth factors and immunoglobulins may help preserve intestinal integrity, reduce endotoxemia, and modulate the gut microbiome, thereby supporting recovery and reducing the risk of gastrointestinal symptoms during training or competition. Although data on gut-related outcomes in athletes remain limited, early findings are promising and merit further investigation.

Despite these promising findings, several limitations must be acknowledged. Many of the included studies were limited by small sample sizes, short supplementation periods, and heterogeneity in dosage and formulation of colostrum. Furthermore, outcome measures varied considerably across studies, complicating direct comparisons. Potential placebo effects and inadequate blinding in some trials may also have influenced subjective outcomes such as symptom reporting. Future research should focus on standardized protocols, longer follow-up periods, and exploration of individual response variability—potentially guided by genetic or microbiome profiling.

Conclusion

Bovine colostrum is a biologically active, nutrient-dense secretion that holds significant promise as a supportive supplement in athletic populations. Its potential benefits span several domains, most notably gut health and immune modulation, where it may help mitigate exercise-induced intestinal permeability and strengthen mucosal immunity. While some studies also suggest modest improvements in recovery and sprint performance, evidence for direct enhancement of endurance or overall athletic output remains inconsistent. Variability in study design, dosing regimens, and colostrum quality complicates interpretation, underscoring the need for standardized protocols and well-controlled clinical trials. Future research should prioritize understanding the bioavailability and mechanisms of key bioactive compounds, as well as establishing clear guidelines for safe and effective use. Until then, colostrum can be considered a safe adjunct for athletes, particularly during periods of heavy training, with its most consistent effects observed in immune and gastrointestinal support.

Disclosures

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Methodology: Bartłomiej Roszkowski
Software: Lidia Mądrzak, Bartłomiej Roszkowski
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All authors have read and agreed with the published version of the manuscript.

Funding Statement: The study did not receive special funding.
Institutional Review Board Statement: Not applicable.
Informed Consent Statement: Not applicable.
Data Availability Statement: Not applicable.
Acknowledgments: Not applicable.
Conflict Of Interest: The authors declare no conflict of interest.

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